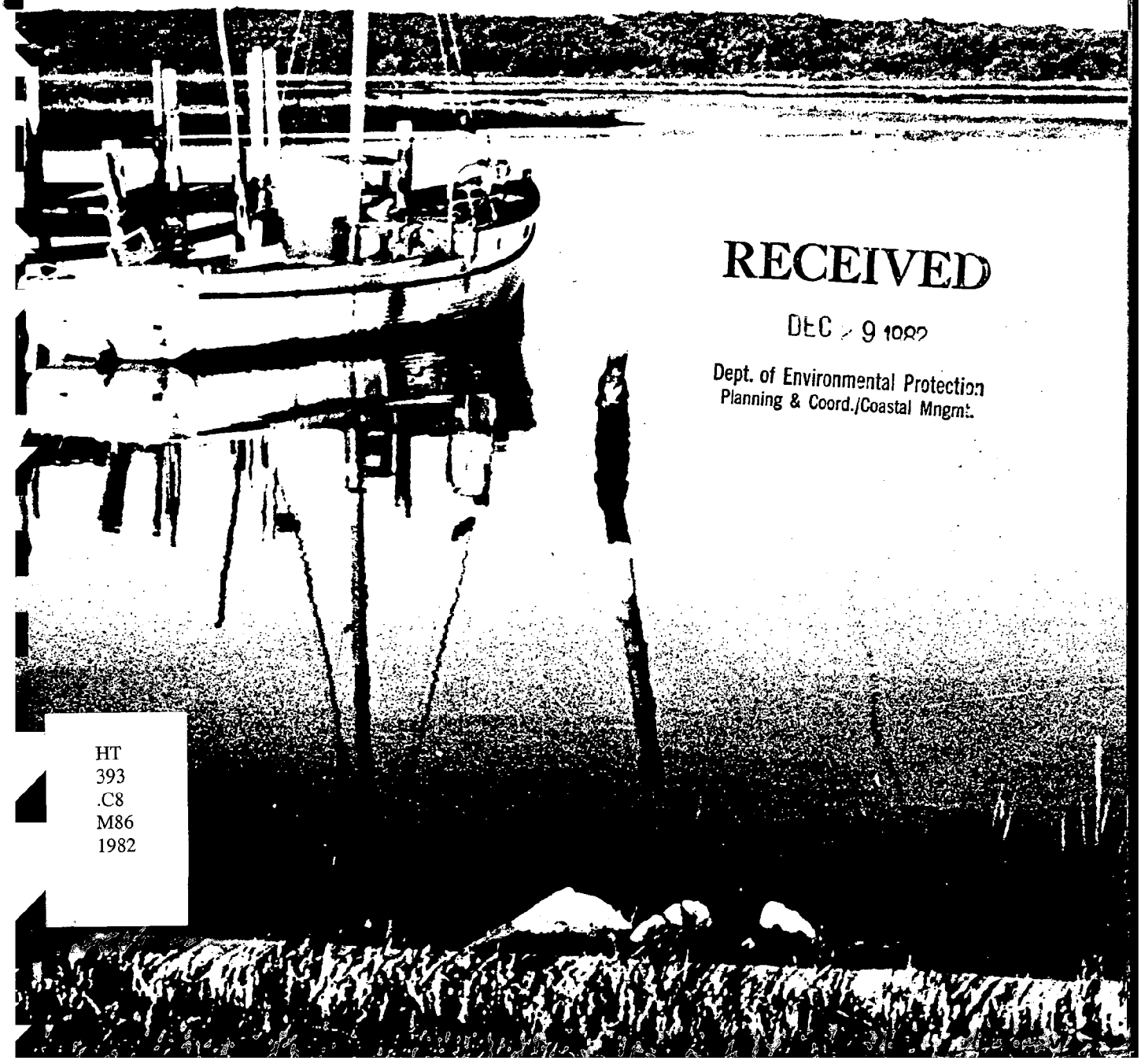
Municipal Coastal Program
Town of Groton, Connecticut



TOWN OF GROTON, CONNECTICUT

MUNICIPAL COASTAL PROGRAM

Prepared by
Raymond, Parish, Pine & Weiner, Inc.
Hamden, Connecticut

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PLANNING COMMISSION

John Cassidy
Lewis Cornelius, Jr.
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Verne Ray
Paul vanDyke
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Lynda Royce
Philip Tuthill

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Robert Hust Environmental Planner
Paul Duarte Planning Technician
Anne Bowman Office Clerk II
Nicki Coope Office Clerk I
Charles Estabrooks Drafting Aide
Richard Gulick*
Susan Weldon*
*No longer members of staff.

TOWN MANAGER

C. Richard Foote

CAM ADVISORY GROUP

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Leonora V. Lewis
Ralph Reynolds
David Campbell
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John Krause
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Frank Pisapia
John Gallen
Joseph Fugere
William Spicer, Jr.
Peter Rotella
Paul D. Scully-Power

RAYMOND, PARISH, PINE & WEINER, INC. - Planning Consultants

Samuel W. Pine, AICP, Supervising Principal
Philip W. Michalowski, AICP, Project Coordinator
Wendy S. Johnston, Project Planner
Elizabeth McGrath, Environmental Planner
Deborah Parriott, Senior Planner
John L. Sarna, P.E., Traffic Engineer
Vera Albert, Research Librarian
Joseph Cellucci, Jr. Planner

Executive Summary

EXECUTIVE SUMMARY

The Town of Groton's Municipal Coastal Program has been written in response to the Connecticut Coastal Management Act (P.A. 79-535) which provided an opportunity for coastal municipalities to write their own coastal programs. The Town of Groton took advantage of this opportunity to address issues and problems within the coastal boundary and propose policies and recommendations for their resolution.

In order to effectively address the issues, Groton's coastal program first examines the coastal land and water resources in the area. The report examines both natural resources and management resources in the area. The natural resources include: coastal waters; islands; geology; shoreline changes; topography; hydrology--both surface waters and aquifers and their water quality; wetlands--both tidal and freshwater; the shore types, such as beaches, dunes, bluffs; intertidal flats--the flat area between high and low tides and generally devoid of vegetation; shellfish beds; and air quality.

The management resources consist of coastal hazard areas--those areas which are subject to 100 year tidal flooding; shorelands, developed shorefronts, and historical resources within the coastal boundary.

The development of the issues in the coastal program was partly based on the preservation of these sensitive resources, for example, the protection of wetlands and water quality, the reopening of shellfish beds, but many of the issues were concerned with providing opportunities for residents to gain access to the coast.

Coastal Issues

In order to facilitate discussion of the issues in the coastal boundary, they were divided into three categories--water-oriented, water's edge and land use. Water-oriented issues include: the maintenance of navigation channels; dredging and filling of the coves, reopening of shellfishing areas; and preservation of water quality. Water's edge issues include: marina development, dock and piers, moorings, partially sunken watercraft at the water's edge; beaches; visual and public access to the water; erosion and waterfront land use. Issues on land, between the water's edge and the 1,000 foot boundary include: the preservation of open space along River Road; traffic congestion in downtown Mystic; the establishment of walkways and bikepaths along the waterfront; the protection of land immediately adjacent to wetlands; the preservation of residential neighborhoods from commercial expansion; preservation of open space at Bluff Point, Sixpenny Island, and Haley Farm State Park; the problem of sewer outfalls in the coves; the expected influx of tourists after the development of the U.S.S. Nautilus Memorial in Groton; the problem of industrial discharge into the coves; and the preservation of open space and establishment of setbacks for new residential development adjacent to the water. The above issues illustrate the diversity of concerns within the coastal boundary.

The development of the policies reflect this diversity as they address both issues on the water and on the land.

Coastal Policies

Policies addressing the coastal waters in Groton include: encourage the maintenance of existing navigation channels by the development of a mooring system in heavy boating areas; upgrade the coves, rivers, and bays; and improve water quality by requiring new development adjacent to the water to tie into existing sewer systems where available. Other policies cover such items as: develop a timetable with the state to reopen marginal shellfish beds; encourage the development of an overall plan for dredging and filling of coastal waters; and encourage control of marina expansion in heavy use areas.

Policies covering recreation and open space include: preserve the open character of the Mystic River; increase public recreational boating access to navigable waterways; expand existing waterfront facilities for recreation, especially beaches; encourage the creation of walkways and bikepaths along the shoreline; encourage the development of the U.S.S. Nautilus as a major high quality tourist attraction while minimizing adverse impacts.

For residential development, coastal policies include: encourage clusters and setbacks for new residential development along the water's edge; establish standards for new residential development along the water's edge; establish standards for new residential construction that retain maximum visual and physical access to the water; encourage new residential development in existing developed areas; and retain the existing residential character of "village" neighborhoods.

Commercial and industrial development is also addressed under the Groton coastal policies. Policies include: preserve the existing character of downtown Mystic; prevent the degradation of water quality where new industrial development takes place within the coastal zone by reviewing potential discharge and containment of industrial waste through the coastal site plan review process; encourage water-dependent industrial and commercial uses adjacent to suitable waterfront areas.

The municipal coastal policies are in addition to the state policies spelt out in the Connecticut Coastal Management Act and in the Department of Environmental Protection Policy Report No. 30. Once the Groton Municipal Coastal Program is adopted, development in the coastal zone must satisfy both state and local policies.

Recommendations - Non-Regulatory

These policies resulted in specific recommendations and actions that the Town should follow. These recommendations include: encourage the harbormaster, in conjunction with the Town, to develop a plan for a mooring system along the Mystic River, and conduct a study to determine the maximum number of land-related marina complexes that the area can accommodate;

protect sewer pumping stations to prevent flows of sewage into the coves during possible breakdowns in the system; develop a program to test septic systems of existing developments along the shoreline to determine whether any are leaking into the coves; develop a plan for dredging and filling of the coves and monitor and study the effects that such activity would have; acquire suitable sites for waterfront parks and/or beaches; encourage the chairperson's committee to become involved in the planning and development of the U.S.S. Nautilus as a tourist attraction.

Recommendations - Plan of Development

As a second part of the development of the coastal program, an analysis was undertaken to compare existing land use with the Plan of Development and the zoning regulations. This method was used to determine whether changes should be made either to reflect existing land use or to protect sensitive areas that may be more suitable for lower density development than they are presently designated.

Proposed revisions to the Plan of Development include (see map): (1) the designation of the area adjacent to the U.S.S. Nautilus as tourist commercial, to reflect future development in the area; (2) the designation of the shoreland area near the Odd Fellows property as moderate density residential use; (3-6) the designation of an industrial area adjacent to Thomas Road and the airport industrial complex; (4) the designation of the southern corner of High Rock Road and Poquonnock Road to professional office use; (5) the designation of the large tract north of Trail's Corner to moderate density residential use; (7) the designation of the area north of Lilly Lane and southeast of Fort Hill Homes to townhouse residential; (8) the area east of Depot Road and north of Industrial Drive to be designated moderate density residential to conform with the Fort Hill area; (9) the designation of the area north of Mumford Cove Estates and south of the railroad to recreation and open space; (10, 11) the development of a new category-marine commercial/recreation--for selected areas adjacent to the water in order to encourage waterfront uses in the area(12). In Mystic, expand the area currently designated waterfront design district to include the commercial frontage north of Main Street, the existing marina south of Fort Rachel Place/Water Street, and the railroad embankment. In the first two instances, this will make the Plan of Development consistent with present zoning and existing land use patterns.

Recommendations - Zoning

In addition to the changes to the Plan of Development, revisions to the zoning regulations are also proposed in the coastal program. These include: establish a new zone, tourist-commercial, around the U.S.S. Nautilus in order to regulate the type of development in the area; the area west of the Poquonnock River zoned commercial, CB-15, presently used as single family development should be rezoned to reflect current use; rezone Bluff Point State Park from industrial IC-40 and RS-20 to low density residential; rezone the area along the west side of Mystic River north of

I-95 to large lot development to reflect environmental limitations. The area north of Lily Lane is moderate density residential and should be reconsidered for townhouse residential.

In addition to specific parcels, proposed amendments to the zoning regulations include: require greater setbacks from the water's edge and wetlands than presently exist in exchange for greater flexibility in siting structures on a particular parcel; control of discharge of hazardous materials and industrial waste from new industrial development in the coastal zone.

The proposed changes in the Plan of Development and the zoning regulations, together with the specific actions that the town should undertake, make up the core of Groton's coastal program. Their implementation should result in an effective management of the coastal area which will protect the sensitive areas, and take advantage of Groton's coastal location by increasing public access to the water, and enhancing the tax base through new development in non-sensitive areas.

I. Introduction

INTRODUCTION

A. COASTAL MANAGEMENT LEGISLATION

The importance of Connecticut's coastal resources and the need for a comprehensive coastal resource management program was formally recognized on June 29, 1979 when the Connecticut Coastal Management Act (P.A. 79-535) was signed into law. This law, which took effect on January 1, 1980, provided a series of policies, standards, and procedures to be used in making decisions concerning Connecticut's coastal resources.

Connecticut's coastal management program was developed in response to the Federal Coastal Zone Management Act of 1972. The Federal act states that "the coastal zone is rich in a variety of natural, commercial, recreational, ecological, industrial, and aesthetic resources... and that there is a national interest in the effective management, beneficial use, protection, and development of the coastal zone." Congress found that both the immediate and potential value of coastal resources is important to the well-being of the nation, and that as a result of "increasing and competing demands upon the lands and waters of our coastal zone...the Congress finds and declares that it is the national policy to preserve, protect, develop, and where possible, to restore or enhance, the resources of the nation's coastal zone for this and succeeding generations."

One of the basic principles of the federal act is the importance of state involvement in coastal zone management. Congress found that "the key to more effective protection and use of the land and water resources of the coastal zone is...through the (state's) development and implementation of the management program...giving full consideration to ecological, cultural, historic, and aesthetic values as well as the needs for economic development."

This act provides grants to coastal states for the development and administration of coastal management programs. Following federal approval of a state's coastal management program, the federal government will provide annual grants covering up to 80 percent of the cost of the program administration. Connecticut's program was approved in September 1980.

The Connecticut Coastal Management Act (CMA) has established a comprehensive coastal resource management program in which responsibility for program administration is shared among both state and municipal governments. The primary state agency involved in the program is the Department of Environmental Protection (DEP) which receives and administers federal coastal zone management funds, and is also responsible for monitoring, evaluating, and coordinating the overall implementation of the program.

The coastal boundary extends from the limit of the State's jurisdiction in Long Island Sound to a continuous line delineated by a 1,000 foot setback from the inland boundary of tidal wetlands, or the interior contour elevation of the 100 year frequency coastal flood zone, whichever is farthest inland.

The Connecticut CMA has established general policies for the coastal area, along with specific policies concerning coastal land and water resources, development, facilities, and uses within the coastal boundary. In addition, the CMA provides definitions for each type of coastal resource, and information on various adverse impacts which may affect such resources.

The policies in the CMA, together with policies taken from other existing statutes, make up the Connecticut Coastal Management Program. These policies serve as a guide to planning, development, acquisition and regulatory activities within the coastal boundary, and they provide uniform standards and criteria for all activities subject to the coastal program. These policies have been adopted and are directly enforceable through the Coastal Program's implementation. The policies are also used to determine the acceptability of projects under coastal site plan review. These policies are collected in one planning document issued by DEP entitled, "Coastal Policies and Use Guidelines."

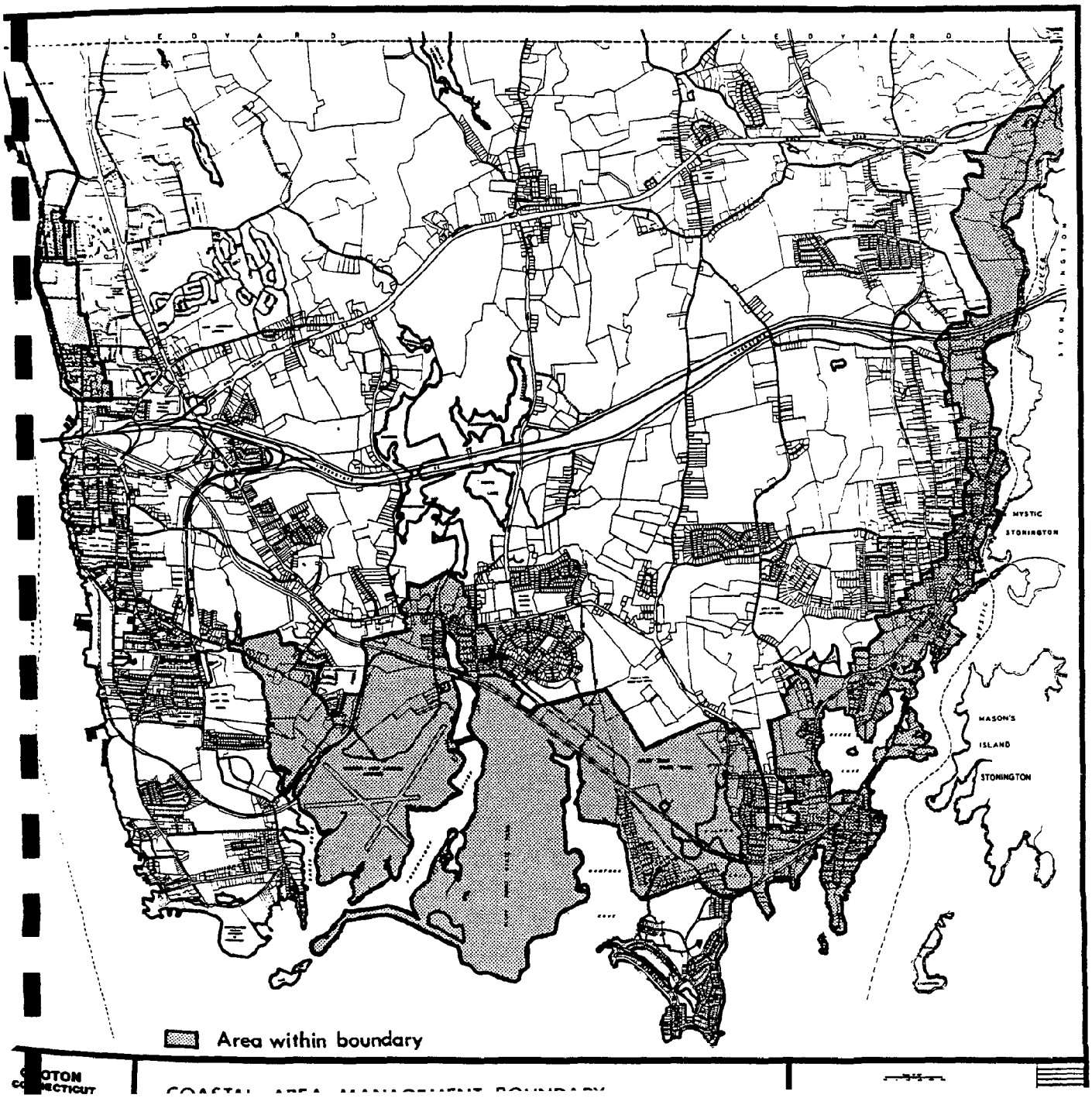
The Connecticut CMA, together with "Planning Report No. 30, Coastal Policies and Use Guidelines," provides a framework by which coastal resource management considerations can be incorporated into the decision-making process at all levels of government, thereby insuring the proper use and development of Connecticut's coastal area.

B. GROTON COASTAL AREA

As defined by the CMA, the Connecticut coastal area includes the land and waters within the southerly and easterly limits of the state's jurisdiction in Long Island Sound, and within the many municipalities bordering Long Island Sound, including the Town of Groton. The act further mandates that within the coastal area there shall be a continuous coastal boundary which encompasses the area most directly affected by the coast, its resources, and its natural processes.

The Connecticut CMA defines coastal resources as "the coastal waters of the State, their natural resources, related marine and wildlife habitat and adjacent shorelands, both developed and undeveloped, that together form an integrated terrestrial and estuarine ecosystem." Therefore, as defined by the Act, the coastal resources of the Town of Groton include both natural features such as beaches and wetlands and manmade features such as marinas and shipyards.

The Town of Groton's coastal boundary extends from the Ledyard town line on the Thames River and extends south to the City of Groton line. The coastal boundary then runs from the city line at Baker's Cove, and runs north of the Groton-New London Airport and Bluff Point State Park. The boundary includes the Poquonnock River north to Route 1, and Mumford Cove (Groton Long Point is not included within the Town's boundary). The boundary then extends eastward north of Haley Farm State Park, and then parallel to the Mystic River, including Palmer Cove, Beebe Cove, and the Village of Mystic, and northward to the Ledyard town line.


MYSTIC
STONINGTON
MASON'S
ISLAND
STONINGTON
Area within boundary

II. Coastal Land and Water Resources

COASTAL LAND AND WATER RESOURCES

A. NATURAL RESOURCES

1. Coastal Waters

The Long Island Sound estuary is located in a preglacial basin which is approximately 110 miles long, and has a maximum width of 25 miles. This basin contains two submarine ridges, which actually divide the Sound into three smaller basins. The central basin is separated from the western basin by the Hempstead sill, and from the eastern basin by the Mattituck sill, which is located off Hammonasset Point. The Mattituck sill limits the flow of tidal waters from the Atlantic Ocean into the central basin, though some exchange does take place through a low point in the ridge.[1] The minimum elevations of the Mattituck[2] and Hempstead sills are 10 and 20 meters respectively.

Long Island Sound is a large estuary in which saline water from the Atlantic Ocean is diluted by fresh water from Connecticut's rivers. This estuary is unusual in that it has two passages with the ocean. The primary eastern passage is through the "Race" between Fishers Island and Plum Island, while the western passage consists of a restricted connection with the East River.

Fishers Island is of particular importance to Groton, since it provides the town's shore with protection from southeast winds and waves.[3] In the Groton area the fetch, which is the unobstructed area of sea surface over which waves are generated by wind, is limited by Fishers Island to a length of approximately four miles. In Groton, the protection provided by the island is strongest between Groton Long Point and the Mystic River.[4]

As defined by the Connecticut CMA, the coastal waters of Long Island Sound include the sound itself, along with its "harbors, embayments, tidal rivers, streams and creeks, which contain a salinity concentration of at least 500 ppm (parts per million) under low flow stream conditions. There are also more specific coastal water classifications, including nearshore waters, offshore waters, and estuarine embayments.

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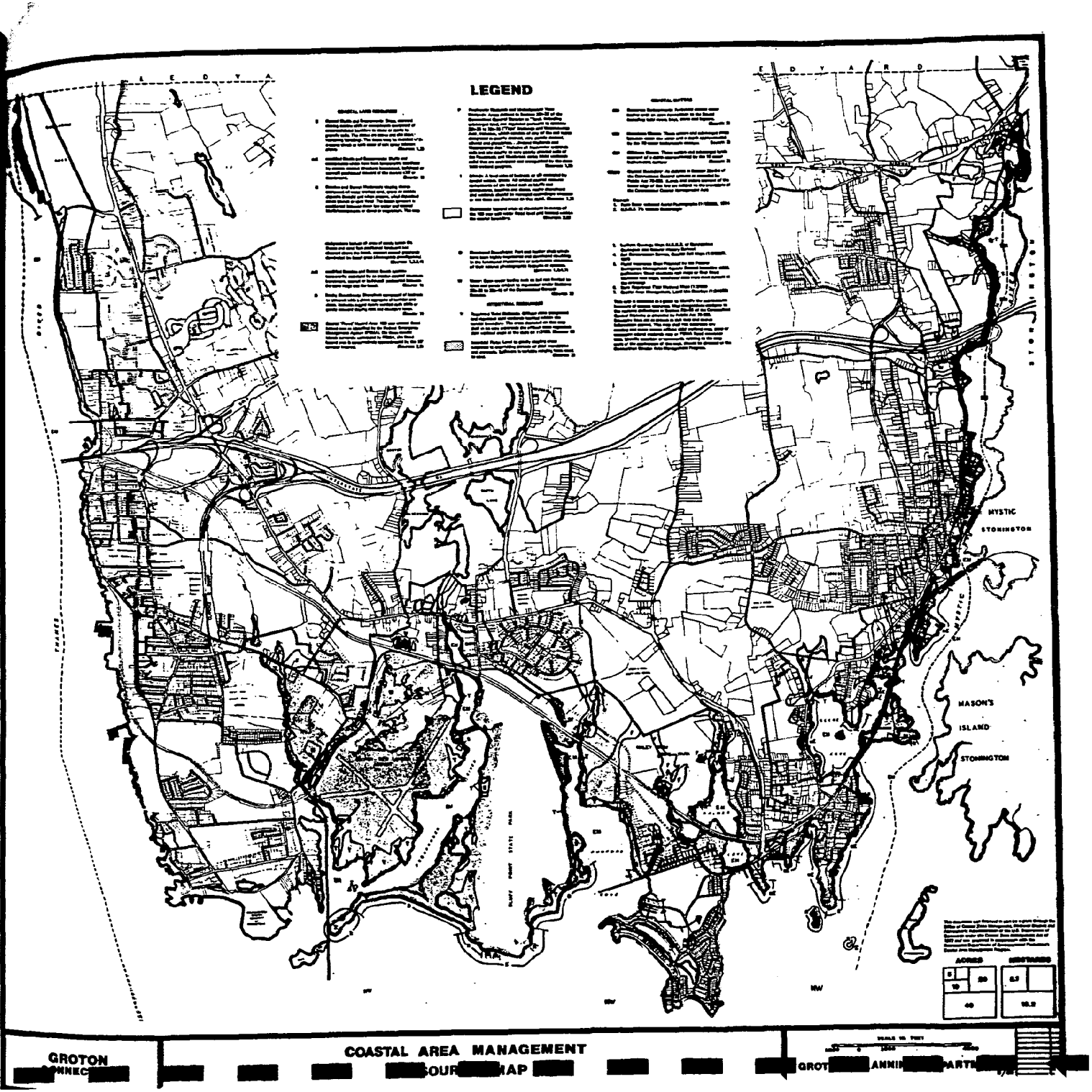
[1] State of Connecticut, Department of Environmental Protection, Shoreline Analysis and Recommended Planning Process, 1979, p. 12.

[2] U.S. Department of Commerce, Office of Coastal Zone Management, and State of Connecticut, Department of Environmental Protection, State of Connecticut Coastal Management Program and Final Environmental Impact Statement, 1980, p. II-8.

[3] Connecticut Department of Environmental Protection, Shoreline Erosion, 1979, p. 56.

[4] Ibid., p. 59.


LEGEND
MYSTIC
STONINGTON
MASON'S
ISLAND
STONINGTON
COASTAL AREA MANAGEMENT
GROTON

Nearshore waters include the water and associated substrates located between mean high water and a depth of ten meters. This area is generally characterized by coarse sediments and a well-mixed water column. Turbulence in this area results in unstable substrate conditions, limiting the suitability of nearshore waters for many marine organisms.[5] Offshore waters are those waters and substrates located seaward of the ten meter contour. The offshore area slopes gently southward, and the water column may be moderately stratified to well-mixed, depending on the specific tidal currents and waves.

Estuarine embayments are defined as "protected coastal bodies of water with an open connection to the sea in which saline sea water is measurably diluted by fresh water including tidal rivers, bays, lagoons, and coves." These embayments are usually characterized by high turbidity and fine sediments, and may contain submerged flats of eelgrass (Zostera marina). Due to their small water volume, fine-textured sediments, and restricted circulation, estuarine embayments are especially susceptible to pollution.[6] The Connecticut coastal area actually consists of a complex series of estuaries, with many small embayments such as Mumford Cove off the major estuary of Long Island Sound.

There are seven major estuarine embayments within or adjacent to the Town of Groton. The Thames River is classified as an estuarine embayment, as is the small inlet near Military Highway and Crystal Lake Road. The southern shore of the town basically consists of a series of drumlins separated by bays or coves. These include Baker Cove, which separates the airport from the City of Groton, and the Poquonnock River. That portion of the river north of the Penn Central railroad tracks is also classified as an embayment. Proceeding east, both Mumford Cove and Palmer Cove are estuarine embayments, as is Beebe Cove. The Mystic River adjacent to Groton is also an estuarine embayment, including the small inlet near Buttonwood Lane.

The other coastal waters adjacent to Groton, such as the areas off the Bluff Point coastal preserve and Groton Long Point, are classified as nearshore waters. Beyond a depth of approximately ten meters, the coastal waters off Groton are considered offshore waters.

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[5] Office of Coastal Zone Management and Connecticut Department of Environmental Protection, Final Environmental Impact Statement, 1980, p. II-10.

[6] Ibid., p. 59.

2. Geology

The composition and configuration of the Connecticut coastal area is a result of both glacial geology and bedrock (preglacial) geology. Connecticut's bedrock geology indicates that the state can be divided into three major physiographic regions, consisting of two highland areas separated by a central lowland.[7] Groton is located in the eastern highlands, where the bedrock consists primarily of folded and faulted metamorphic rocks.[8] Some of the major bedrock formations in the town include the New London gneiss, which is found near the airport; the Mamacoke formation, a biotite-quartz-orthoclase gneiss which underlies the Fort Hill area and part of Bluff Point; and the Plainfield formation and biotite granite gneiss, which are found in the central portion of the town.

The most recent glaciation to affect the Connecticut coast was the late Wisconsin glacier, which reached its peak in this area approximately 18,000 years ago when it extended across Long Island. The Ronkonkoma and Harbor Hill moraines on Long Island represent equilibrium points where the southward movement of the ice was offset by a regional warming trend.[9] As the glacier receded, the existing Long Island Sound basin filled with meltwater, forming a freshwater lake that was separated from the ocean by the Mattituck sill.[10] The basin remained a freshwater lake until about 8,000 years ago when the rising sea level changed it to a saline body of water.

As the glacier advanced across what is now Connecticut, till, which is the unsorted and unstratified material transported by glaciers, was deposited across the land. Much of this till was deposited in drumlins, which are elongated hills in which the long axis parallels the direction of ice movement. Drumlins in the Town of Groton include the Bluff Point peninsula, Fort Hill, and the hill between Palmer Cove and Beebe Cove. In general, drumlins in Connecticut are thought to be most common where there were pre-glacial hills.[11]

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[7] Connecticut Department of Environmental Protection, Shoreline Erosion, 1979, p. 5.

[8] Ibid.

[9] Connecticut Department of Environmental Protection, Long Island Sound: An Atlas of Natural Resources, 1977, p. 4.

[10] Ibid.

[11] Connecticut Department of Environmental Protection, Shoreline Erosion, 1979, p. 9.

Another type of glacial deposit found in Groton is outwash, which consists of silt, sand, and gravel deposited by melt water streams from the glacier. Unlike till, outwash is sorted and stratified, and serves as a highly productive aquifer. The major glacial stream deposit in Groton is in the Poquonnock River Valley, and includes the airport site, the Poquonnock Bridge area, and the reservoir area.

3. Shoreline Changes

A shoreline is a dynamic land form which is constantly responding to the forces of tidal currents, waves, sea level changes, winds, and man. The changes that have taken place along the Groton shoreline during the past 150 years are evidence of the strength of these forces. These changes have taken place primarily along the southern shore of the town facing Long Island Sound.

The configuration of the tidal wetlands at the southern edge of the airport peninsula has shown a number of changes since the mid-1800's. These changes have resulted both from the natural processes of tidal currents and sedimentation, and from man-made activities, such as the construction of the airport and the building of mosquito ditches in the wetlands. The most substantial changes have taken place at the southern-most tip of the peninsula, where the tidal wetlands have receded approximately 500 feet since 1846. New inlets and tidal creeks have also formed in this wetland system since the mid-1800's. The tidal wetlands on the east side of the Poquonnock River have also changed since this time, receding approximately 200 feet.

The Bushy Point barrier spit is one of the most dynamic landforms in the town, having undergone a number of significant changes in the last century. In the mid-1800's Bushy Point beach was connected to the rocky Bushy Point Island, and thus was classified as a tombolo. A tombolo is a landform in which offshore rocks, such as those at Bushy Point, are connected to the mainland by a beach system or barrier sand spit. At this time the tombolo was also located approximately 100 feet south of the current barrier spit location. One of the major changes to this area took place during the 1938 hurricane when the tombolo was breached, thus forming a barrier sand spit which is separate from the rocky Bushy Point Island. Though this breach still remains, it has been filling in, and at present the water between the spit and the island is very shallow.

The southern tip of the Bluff Point peninsula, which consists of bedrock outcroppings, has not changed significantly since the 1800's. However, the wetlands on the eastern side of the peninsula have undergone some changes, with most increasing in size as a result of the accumulation of sediments. The configuration of the small point opposite Halyard Road has also changed, and a

small sand spit has accumulated at the end of the point. There have also been some minor shoreline changes on the eastern side of Mumford Cove, and also in Palmer Cove. In some areas the shore has receded slightly, and in other areas there has been some accretion.

The West Cove area has also been subject to erosion, with some areas losing approximately 200 feet of shore since 1840. The southern tip of the Noank Peninsula has undergone both accretion and erosion, and in 1883 portions of the peninsula were 300 feet narrower than in 1940. There have been fewer changes along the east shore of the Noank peninsula, though the configuration of Sixpenny Island has changed significantly in the past century.

4. Topography

The topography of the Town of Groton is extremely varied, and is a reflection of the glacial activity that once took place in the area. In general, the topography of the upland area north of Interstate Route 95 is irregular and hummocky, while the lowland area south of Route 95 contains smooth drumlins and level floodplains.

The coastal area adjacent to the Thames River contains a number of hills and some steep slopes. The developed portion of the naval submarine base is relatively level, though to the north there is a hill with a peak elevation of approximately 230 feet m.s.l., and slopes approaching 30 percent. This area also contains a small body of fresh water known as Rock Pond, which drains into the Thames River. South of Crystal Lake Road is a drumlin known as Bailey Hill, which has a peak elevation of 244 feet m.s.l. The slope of Bailey Hill averages 15 percent, though in localized areas the slope may be steeper or flatter. Other than the Thames River, the only other body of water located in this portion of the coastal zone is Goss Cove, which is located near Crystal Lake Road.

The next portion of the town located within the coastal boundary is the airport area. Much of this area is a glacial stream deposit, and as such has relatively level topography. The land south of Poquonnock Avenue, and the airport area, including the freshwater ponds, is level and at an elevation of approximately 10 feet m.s.l. Most of this area is rimmed with tidal wetlands, and there is also a pond west of Thomas Road. The only area within this portion of the coastal boundary that shows some topographic relief is the Trails Pond area. The land in this area contains some low-lying wetlands around Plain Creek, and then rises to an elevation of 110 feet m.s.l. This results in some steep slopes of approximately 25 percent.

The coastal boundary encompasses the Poquonnock River, and extends north to the southern edge of the Groton Reservoir. The land adjacent to the head of the river is relatively level, and at an elevation between 10 and 20 feet m.s.l. However, there are some small hills with elevations of approximately 70 feet m.s.l. near Buddington Road.

The entire Bluff Point peninsula, which consists of a drumlin, is included within the coastal boundary. This typical elongate drumlin has a peak elevation of 128 feet m.s.l., and slopes ranging from 5 to 20 percent. Bedrock is evident along the southern edge of this drumlin, where the glacial till has been eroded by marine processes. Another feature of this area is Bushy Point beach, a barrier spit which extends across the mouth of the Poquonnock River. This spit is at an elevation below 10 feet m.s.l., and is connected to Bluff Point by a system of tidal wetlands. Both the eastern and western sides of this drumlin are edged with tidal wetlands and inlets.

The area between Mumford Cove and Palmer Cove, and extending from Groton Long Point north to Fitch High School, is also part of the Groton coastal zone. South of the Penn Central railroad tracks this area is low and level, and contains many wetlands. North of the railroad tracks is the southern edge of the Fort Hill drumlin, with elevations between 10 and 100 feet m.s.l. and a slope averaging 10 percent. There is also a small hill with an elevation of 50 feet m.s.l. on the northwest side of Palmer Cove.

The land located between Palmer Cove and Beebe Cove is also part of a drumlin. This land has a peak elevation of 110 feet m.s.l., and descends towards each cove at a slope of approximately 10 percent. The topography in the community of Noank consists of a few small hills, with elevations ranging from sea level to 50 feet m.s.l. The land on the north side of Beebe Cove includes Beebe Pond, which drains into the cove, and a number of small hills.

Most of the land bordering the Mystic River south of Route 95 is also part of a drumlin, known as Pequot Hill. Elevations in this portion of the coastal boundary range from sea level to 100 feet m.s.l., while slopes average 10 percent. This drumlin is not as smooth and even as some other drumlins in the town, so the topography adjacent to the Mystic River is slightly more irregular. One feature of this area is a hill north of Starr Street, which has a peak elevation of 100 feet m.s.l., and slopes of 25 percent.

The Mystic River coastal area north of Route 95 is characterized primarily by steep slopes and irregular topography. In the vicinity of the Mystic Oral School elevations peak at 150 feet m.s.l.; and descend towards the river at a slope of 10 percent.

This hill also slopes down towards a wetland and creek which flows east from Cow Hill Road into the river. The land rises sharply on the north side of this creek, with a slope of approximately 50 percent. This steep, irregular topography is also present on the west side of River Road. This area has a peak elevation of 200 feet m.s.l., and then slopes down to the north towards Haleys Brook.

5. Hydrology

a. Surface Water

Two important concepts concerning surface water in Groton are watersheds and streambelts. A watershed is all the land area drained by or contributing water to a stream, pond, or other body of water. The Town of Groton may be divided into six watersheds, with the surface water within each watershed draining towards a different point.

Watersheds are an important hydrologic unit, and since water travels through the basin, changes in one portion of the watershed can also affect other areas of the watershed. Thus, activities in the northern or central portion of the town may be well removed from the coastal boundary, but may still have an impact on coastal resources.

As a result of Groton's coastal location, its watersheds are complex systems, and consist of a number of major functional components. These include:

- inland wetlands — act as storage areas, also important in recharging aquifers.
- lakes and ponds — storage of fresh water, provide wildlife habitat.
- streambelts — transportation of water and nutrients.
- estuaries — marine food production, act as a buffer against storms.
- tidal wetlands — nutrient production, storage of flood water.

Streambelts may be defined as "environmental corridors of land and water which follow the general stream courses, and which contain many features with important bearing on water-related aesthetic, recreational, wildlife, historic, and land use aspects of the town."[12] Streambelt lands

[12] Town of Groton Planning Director's Office, Environment, Groton Connecticut, 1972, p. 16.

include water courses and their banks, adjacent lands which are subject to frequent overflow, associated wetlands, land with other special environmental value, the shorelines of associated lakes and ponds, and other lands that form a continuous streambelt system.[13] Some of the important functions served by streambelts include water supply, flood control, water storage, groundwater recharge, filtration of pollutants, and the provision of wildlife habitat.

Streambelts are one of the major components of watersheds, and they are the major route by which surface water travels through a watershed. There are six watersheds in Groton, and portions of each are within the town's coastal boundary.

The first watershed encompasses most of the City of Groton, along with a portion of the town adjacent to the Thames River. Other than the Thames River, there are no major streams in this watershed.

The land from the Penn Central railroad crossing of Baker Cove north to Route 95, and from Groton Heights east to the Buddington Road area, constitutes the second watershed. The major streambelts within this watershed include Plain Creek and its tributaries, along with other tributaries to Baker Cove. Trails Pond and Lake George are also included within this streambelt system.

The third watershed is extensive, and in the northern portion of the town includes all land between Pleasant Valley road and Lambstown Road. To the south this watershed narrows, but still includes the town's reservoir system and the Poquonnock River. The streambelts within this watershed include the Poquonnock River, Groton Reservoir, Poquonnock Lake, Ponegnut Reservoir, Buddington Pond, Hempstead Brook, Beaverdam Brook, Great Brook, and the Ledyard Reservoir.

The fourth watershed generally encompasses Fort Hill Brook and its tributaries, such as Hatching House Brook. This watershed extends from North Road on the west to Flanders Road on the east, and from Mumford Cove north to Route 184. Mumford Cove and its associated wetlands are also included in the streambelt system within this watershed.

The area between Palmer Cove and Route 95, and from Flanders Road to West Mystic, forms the fifth watershed. Eccleston Brook and Fishtown Brook, which both drain into Palmer Cove, are the major water courses in the streambelts in this area.

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[13] Ibid., p. 16-18.

The final watershed includes the communities of Noank and West Mystic, while north of Route 95 this watershed extends west to Flanders Road. The major streambelts in this watershed include Bindloss Brook, Haley's Brook, and Branch Brook, which all drain into the Mystic River.

b. Water Quality

The Connecticut Department of Environmental Protection has adopted water quality classifications and standards for the inland and marine waters of the state. Existing water quality classifications and future goals for bodies of surface water in the Groton area are as follows:[14]

	Existing Water Quality Classification	Future Water Quality Classification Goal
Thames River	SCc	SBc
Baker Cove	SB	SB
Groton Reservoir & tributaries	AA	AA
Poquonnock River	SA	SA
Mumford Cove	SB	SA
Palmer Cove	SA	SA
Beebe Cove	SB	SB
Mystic River	SB	SB

Class AA inland waters are of the highest quality, and include "existing or proposed drinking water supply impoundments and tributary surface waters." Class SA marine waters are described as "suitable for all sea water uses including shellfish harvesting for direct human consumption, bathing, and other water contact sports." Class SB marine waters are "suitable for bathing, other recreational purposes, industrial cooling and shellfish harvesting for human consumption after depuration; excellent fish and wildlife habitat; good aesthetic value." Class SC waters are described as "suitable for fish, shellfish and wildlife habitat; suitable for recreational boating and industrial cooling; good aesthetic value." In addition, the subscript c indicates that the

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[14] Connecticut Department of Environmental Protection, Connecticut Water Quality Standards and Classifications, Approved 1973, Amended 1977; Personal Communication with Bob Hust, Town of Groton Department of Planning, 5 November 1981.

river is suitable for cold water fisheries, especially fish passage. The water quality standards for each of these classes are included in Appendix A.

The Thames River, which forms the western boundary of a portion of the town, is one of the three largest tributaries to Long Island Sound.[15] The Thames River estuary extends north from Long Island Sound for approximately 16 miles, to the confluence of the Shetucket and Yantic Rivers at Norwich. Though the river is a major tributary to Long Island Sound, the volume of fresh water entering the river is small in comparison with the volume of sea water, as evidenced by the location of the salt water/fresh water interface.[16] During the summer and fall when the fresh water inflow is normally low, the salt wedge extends approximately two miles up the Shetucket River and one mile up the Yantic River. During the winter and spring when the volume of fresh water entering the river is high, the salt water/fresh water interface is generally located at Norwich. Thus, the salt wedge extends north of Groton throughout the entire year.

Another estuary in the Groton area is Mumford Cove, which has a number of water quality problems resulting from the presence of a sewer outfall. The town currently pumps about 4 million gallons of treated wastewater into the cove each day, and a study is underway to evaluate the effects of this discharge.[17] The addition of this treated wastewater is increasing the rate of eutrophication in the shallow cove, and promoting the growth of seaweed. Other problems noticed by the researchers and area residents include increased turbidity, discoloration of the water, and an odor. Increased siltation, which has resulted in poor circulation, is also a problem in Mumford Cove. The town has been ordered to discontinue discharging treated sewage to the cove, so the current study is also analyzing alternative solutions to the sewage problem.

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[15] Connecticut Department of Environmental Protection, Shoreline Erosion, 1979, p. 55.

[16] U.S. Department of Transportation and U.S.Coast Guard, Draft Environmental Impact Statement for the Location, Construction and Operation of the U.S. Coast Guards New London Station, Research and Development Center and Support Facilities in New London, CT, 1975, 1-62-64.

[17] "Mumford Cove: Disaster in the Making?", New London Day, 20 October 1981, p. 9-10.

Other coastal waters in the Groton area have also been subject to various water quality problems. The airport currently discharges treated sewage into Baker Cove, resulting in poor water quality and the closing of shellfish beds. However, this area has recently been sewered, and when the airport ties in with this system in the near future, water quality in Baker Cove should improve.

The Poquonnock River, which is a Class SA water, was closed to shellfishing between May and October of 1981 as a result of a local hardware store fire which allowed pesticides to enter the river.[18] However, the natural flushing process has cleansed the river, and the lower three-quarters of the river are again open to shellfishing. There are still, however, some problems with high coliform counts in a small area at the northern end of the river. It is not known whether these high coliform levels have a human source, or whether they are from the water fowl in the area. Another problem of the Poquonnock River is siltation, especially at the mouth of the river.

Palmer and West Coves also have problems with siltation, while Beebe Cove has poor water quality due to the Town of Stonington sewage outfall on the Mystic River. Other general water quality problems in the Groton area include sedimentation due to road sanding and new construction, and stormwater discharges into the area coves.

The Mystic River forms the eastern boundary of town and is classified as a SB water quality estuary. Because of the Town of Stonington sewer outfall discharge, future quality is expected to remain. A number of shellfish concentration areas exist in the river and its coves, but have been closed to shellfishing due to poor water quality. The river has good aesthetic, habitat and recreational value, and is used considerably for a variety of recreational fishing and boating purposes.

c. Aquifers

An aquifer is a rock, sand, or gravel formation which stores and transmits ground water. There are different types of aquifers, and those found in the Town of Groton include stratified drift, bedrock, and till aquifers. Stratified drift aquifers, which were formed by glacial activity, are the most productive aquifers, and thus the most valuable as a water supply source.

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[18] Personal Communication with Seth Wakeman, Chairman, Groton Shellfish Commission, 6 November 1981.

Stratified drift aquifers in Groton are found in the floodplain and lowland areas where they were deposited by glacial streams. The major stratified drift aquifer in Groton is in the Poquonnock River Valley. This aquifer is located beneath the airport peninsula and the western side of Bluff Point, and then extends north through the reservoirs and along Great Brook and North Road to Ledyard Reservoir. Other stratified drift aquifers are located beneath the Eccleston Brook area, Haleys Brook, portions of the west bank of the Mystic River, the Beaverdam Brook area, and the wetland area north of Gungywamp Road.

6. Wetlands

a. Tidal Wetlands

Tidal wetlands in the Town of Groton include both designated tidal wetlands and undesignated tidal wetlands. Undesignated tidal wetlands, which include very poorly drained soils of the Pawcatuck and Westbrook series, are classified with freshwater wetlands on the state's coastal resource maps. Designated tidal wetlands are those which have been inventoried and mapped by DEP, and are subject to the state Tidal Wetland Regulations.

Tidal wetlands, or salt marshes, are grassy coastal floodplains which contain, or are periodically inundated by, salt or brackish water. There are four general vegetation zones within a tidal wetland, with the zones determined by elevation and the frequency with which tidal flooding occurs.[19] From low to high marsh, these zones are: (1) the lower slope, which is flooded daily and is dominated by salt marsh cordgrass (Spartina alterniflora); (2) the upper slope, which is primarily vegetated with salt marsh hay (Spartina patens) and spike grass (Distichlis spicata), and may be flooded by high tides about ten days out of a month; (3) a somewhat higher area which is inundated only during storm tides, and which is dominated by black grass (Juncus gerardi); and (4) the transitional zone between the marsh and the upland, which is flooded only during severe storms and contains switch grass (Panicum virgatum).

[19] U.S. Department of Commerce, Office of Coastal Zone Management, Final Environmental Impact Statement and the Proposed Connecticut Coastal Management Program, 1980, p. II-11.

Groton contains many tidal wetland areas along its coastal waters, though most of these wetlands have been affected by man's activities. Over the years some wetlands in the town have been filled in, while mosquito ditches have been dug in some of the remaining wetlands, disturbing the flow of tidal water and other natural processes in the marsh. Despite the adverse impacts of such activities, the tidal wetlands are still an extremely important coastal resource, performing the following vital functions:

(1) Marine Food Production - tidal wetlands are one of the most productive ecosystems in the world; they have a very high concentration of nutrients. Two-thirds of all commercially harvested fish and shellfish depend on the marsh estuarine system at some time in their life cycle.

(2) Wildlife Habitat - tidal wetlands are important as breeding, nesting, and feeding grounds.

(3) Flood and Storm Control - tidal wetlands serve as a natural buffer, protecting upland and developed areas from storm tides and absorbing wave damage.

(4) Recreation - tidal wetlands provide many opportunities for hunting, fishing, birdwatching, etc.

(5) Pollution Control - tidal wetlands serve as an important basin in which organic pollutants are chemically and biologically converted into useful nutrients.

(6) Sedimentation - tidal wetlands absorb silt and organic matter, which otherwise would obstruct channels and harbors.

The northwestern portion of the town's coastal zone, which borders the Thames River and includes the submarine base, contains no tidal wetlands. Proceeding south, the next portion of the town encompassed by the coastal boundary is the airport area, which is rimmed with tidal wetlands. Plain Creek and Baker Cove, which form the boundary between the city and town of Groton, are both lined with a narrow band of tidal wetlands. This wetland system also extends northeast along a branch of Baker Cove, forming the northwest perimeter of the airport. The southern tip of the airport peninsula, which is bordered by Baker Cove and the Poquonnock River, consists of a relatively large salt marsh, totalling approximately 50 acres and containing a number of mosquito ditches. There is also a narrow band of tidal wetlands bordering the western edge of the Poquonnock River as far north as the Penn Central railroad tracks. Two small tidal wetlands are located at the head of the Poquonnock River near Fort Hill Road.

Bluff Point State Park, which contains the most extensive tidal wetland system in the town, is also included in the coastal boundary. There are four small individual tidal wetlands along the western side of this coastal preserve, bordering the Poquonnock River, while the southwestern portion of the preserve consists of one large, continuous wetland. This wetland includes approximately 125 acres, and extends along the barrier beach spit at the mouth of the Poquonnock River. There is also a narrow band of tidal wetlands along the eastern side of the preserve, bordering Mumford Cove. The Mumford Cove tidal wetland system also extends north of the Penn Central railroad tracks for a short distance, encompassing the lower reaches of Fort Hill Brook, and also borders the east side of the cove as far south as Bramble Road.

Palmer Cove to the east is also edged with tidal wetlands. The lower portion of the cove is located between Groton Long Point Road and the railroad tracks, and contains no wetlands. However, the land bordering the western and northern sides of the cove is classified as a tidal wetland, as is a small tidal pond located north of the railroad tracks and draining into the western inlet of the cove.

Proceeding east, the next area of Groton which contains tidal wetlands is Beebe Cove. There is a small tidal wetland west of Elm Street and north of Brook Street, and another along the north shore of Beebe Cove near the Fishtown Road/Bank Road intersection. The small island in the cove is classified as a tidal wetland, as is all of Sixpenny Island. The Sixpenny Island wetland consists of approximately 35 acres, and contains many mosquito ditches, which have hindered the natural tidal processes and reduced the quality of this wetland. The area surrounding Little Gilbraltar Road, which is north of Beebe Cove near the railroad tracks, contains approximately 15 acres of tidal wetland, with a number of other scattered wetlands located along the railroad as far north as Buttonwood Lane.

Continuing north along the Mystic River there are some small tidal wetlands adjacent to River Road just south of Route 95 near Bindloss Road, and also some north of Route 95 between River Road and the river. A slightly larger wetland of 10 acres is located along the river by Haley's Brook, and another wetland is located near the intersection of Route 27 and River Road.

In 1971, biological surveys of the flora and fauna of some of Groton's tidal wetlands were completed by the University of Connecticut. The university's Marine Research Laboratory in Noank surveyed the wetlands of Mumford Cove, while the Biological Sciences Group from Storrs evaluated the salt marshes along the Mystic River. These wetlands were surveyed for the presence of those plant species listed in Connecticut General Statutes Section 22a-29 (Wetlands and Water Courses) as being indicative of a wetland. These surveys were taken from the Town of Groton's Environment Report (July 1972) and are included in Appendix B.

b. Freshwater Wetlands

Freshwater wetlands in Connecticut are designated according to soil type, with any soil classified by the U.S. Soil Conservation Service as poorly drained, very poorly drained, alluvial, or floodplain, considered a wetland. these inland wetlands are protected and regulated under the Connecticut Inland Wetlands and Water Courses Act.

Freshwater wetlands, like tidal wetlands, also perform many important ecological roles. They are a major factor in flood control, acting as storage basins and reducing flood crests and erosive capacities. Another hydrologic role performed by some inland wetlands is groundwater recharge. The wetlands can also act as a natural pollution control system by filtering out potentially harmful materials. These productive inland wetlands are also important in food webs, and they provide habitat for a variety of wildlife species.[20]

The developed western portion of the town along the Thames River contains no freshwater wetlands within the coastal boundary. Proceeding south, there are some freshwater wetlands near Plain creek and High Rock Road. Trails Pond, the lower portion of which is located in the coastal area, is classified as a wetland, as is some land along High Rock Rock, Poquonnock Road, and John Drive. There are also two freshwater wetlands north of Poquonnock Road on either side of Filter Plant Road.

There is an inland wetland of approximately 10 acres which is located near Tower Avenue north of the airport, and which supports a number of rare species. During the early spring when the groundwater table is high most of this wetland area is flooded. During the growing season the water table

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[20] Allen Carroll, Department of Environmental Protection, Developer's Handbook, N.D., p. 7.

lowers, until during the late summer standing water is confined to one large pond, and a number of small ponds. The rare species which are found on this property include the state endangered osprey, and a wetland sedge which is considered rare in both Connecticut and New England. The rare sedge grows in shallow water along the edges of the ponds, and is found in scattered, but dense colonies. Other vegetation found in this wetland area includes speckled alder, arrowwood, a variety of willows, sensitive fern, spirea, and many species of sedges.

The southern portion of Fort Hill Brook, and its adjacent lowlands, have also been identified as a freshwater wetland. Approximately 1,000 feet east of this wetland is another of 40 acres, which drains into Mumford Cove and is the largest freshwater wetland within the coastal area. There are a number of other freshwater wetlands in the Haley Farm State Park area, including one which drains into the western inlet of Palmer Cove, and two which drain into the northern edge of the cove near Brook Street. There is also a small wetland near Marlin Drive which drains into a channel leading to Mumford Cove.

There are two small freshwater wetlands on the western side of Beebe Cove; one is located between Beebe Pond and the cove, and the other is located near Fishtown Road and Center Street. There are also two wetlands north of Beebe Cove, including one located near Noank Road and Cedar Road, and another approximately 200 feet east of this. Other wetlands draining into the lower portion of the Mystic River include one situated between Thomas Street and Irving Street, and one extending from Orchard Lane towards the river.

Continuing north along the Mystic River, there are a series of freshwater wetlands located just south of Interstate Route 95. These wetlands are generally located between High Street/Cow Mill Road and the river. In addition, there are also two small wetlands immediately north of Route 95 near Oral School Road.

There is also a series of freshwater wetlands between Route 95 and the Gold Star Highway. The largest of these include streambelt land around Haley Brook, and land surrounding the pond near the intersection of Route 27 and River Road.

7. Shore Types

The Town of Groton contains a wide variety of shore types, including developed areas and an assortment of natural coastal

features. In general, the southern shore consists primarily of natural features, while the Thames River and Mystic River shorelines contain both developed and natural areas.

Those areas with natural coastline features, such as beaches and wetlands, do not necessarily consist of undeveloped land. Many residential uses in the town, and even the airport, are located adjacent to coastal waters and have a fringe of natural shore types. An area does not need to be vacant or undeveloped in order for the actual land/water interface to be classified as a natural shore type.

As defined in the CMA, beaches and dunes include "barrier beach spits and tombolos, barrier beaches, pocket beaches, land contact beaches and related dunes and sandflats." Beaches have further been described as moderately sloping shores composed of water worked sand, gravel, or cobble deposits, or areas of sandy beach fill. The beaches along the Connecticut coast have developed under conditions of low wave energy, and as a result the beaches tend to be narrow, generally less than 200 feet wide. The beaches are often interspersed with headlands or rocky areas which impede the littoral transport of sand, making "pocket" beaches the most common beach type in the state.

Dunes, which consist of a ridge of wind deposited (aeolian) sand positioned landward of the beach, support coastal grasslands dominated by beach grass (Ammophila breviligulata). Large aeolian dune systems are not common in Connecticut; most consist of a single ridge elevated approximately 3 to 6 feet above the beach.[21] These dunes systems are not substantial enough to provide the needed protection from salt spray for the development of a scrub woodland. The most common vegetation along the dunes in Connecticut is beach grass and poison ivy (Rhus radicans).

Rocky shorefronts are defined in the CMA as "shorefronts composed of bedrock, boulders, and cobbles that are highly erosion resistant and are an insignificant source of sediments for other coastal landforms." Rocky shorefronts may include nearly vertical rock cliffs, or gently seaward sloping rock and boulderly lands. The rocky intertidal areas provide a sequence of habitats, or zones, for marine organisms which require a hard substrate for attachment. Marine invertebrates, such as barnacles, limpets, or mussels, inhabit zones according to the frequency with which they need to be inundated, while light intensity governs the location of plants.

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[21] U.S. Department of Commerce, Office of Coastal Zone Management, Final Environmental Impact Statement and the Proposed Connecticut Coastal Management Program, 1980, p. II-12.]

Another shore type occurring in Groton is classified as coastal bluffs and escarpments. As defined by the CMA, these are "naturally eroding shorelands marked by dynamic escarpments or sea cliffs which have slope angles that constitute an intricate adjustment between erosion, substrate, drainage and degree of plant cover." These formations are located at the edge of glacial drift headlands, and are composed of unconsolidated bouldery/stony or sandy/gravelly soils. Along much of the Groton shore these bluffs and escarpments have been modified, and are defined as "bluffs and escarpments which have been temporarily stabilized by erosion control structures (revetment, bulkhead, or seawall) positioned seaward of the marine cliff or escarpment."

Some areas of the Groton coastline, especially along the Thames River, have been classified as developed shorefront. This category is defined in the CMA as "those harbor areas which have been highly engineered and developed, resulting in the functional impairment or substantial alteration of their natural physiographic features or systems."

Starting in the northwest portion of Groton, the first area of the town to be included in the coastal boundary is the naval submarine base. From Crystal Lake Road to the northern perimeter of the town, this portion of the shoreline, which consists primarily of docking facilities for naval vessels, has been classified as developed. From Crystal Lake Road south to the Groton city limits, the shoreline has not been classified on the state's coastal resources maps. However, the Penn Central railroad tracks, which parallel the Thames River, are a major feature of this area. There is a narrow strip of land between the tracks and the river which is lined with rocks, and which supports some vegetation.

The peninsula on which the Groton-New London Airport is located is formed by Baker Cove/Plain Creek and the Poquonnock River, and is fringed by at least a narrow band of tidal wetlands along these waterways. In addition, the Old Town Beach is located on the eastern side of this peninsula. The shore of the river north of the Penn Central railroad tracks is lined primarily with residential uses, with some narrow strips of tidal wetlands and other vegetation immediately adjacent to the water. The eastern shore of the Poquonnock River, most of which is part of the Bluff Point coastal preserve, contains a variety of shore types.

The northern portion of the western shore of Bluff Point contains a few small tidal wetlands and one beach, while the remainder consists of a very narrow strip of sand and rocks between the

woods and the river. The southern portion of this western shore consists of an extensive tidal wetland which extends into an east-west oriented barrier spit across the mouth of the Poquonnock River. The northern side of this spit consists of a tidal wetland, while the southern shore consists of a sandy beach and the island at the western end of the spit has a rocky shorefront. This barrier spit, which is known as Bushy Point and is 4,000 feet long, is one of the few remaining natural beach systems in Connecticut. This spit contains no seawalls, groins, or jetties, and is unaltered by man-made development.

This beach system extends east to Bluff Point, where the rocky shorefront consists of bedrock exposed by marine erosion. The entire southern tip of the Bluff Point drumlin has been classified as an escarpment, and includes scattered areas of rocks. North of Mumford Point the shore is more level, and consists of a narrow sandy beach. This beach is approximately 3,500 feet long, and ends in a sand spit that extends into Mumford Cove. The remainder of the eastern shore of Bluff Point borders Mumford Cove, and consists of a narrow band of tidal wetland. The northern portion of the eastern side of Mumford Cove also contains a wetland, while the southern portion, which is adjacent to the Neptune Drive residential area, consists of a sandy beach. At the southern end of Neptune Drive and Anchorage Circle the shore has been classified as a modified bluff and escarpment.

The next portion of the town to be included in the coastal boundary is the Palmer Cove area. The outer portion of Palmer Cove, which is located between Groton Long Point Road and the railroad tracks, contains a marina and docking facilities. Most of the shoreline in this outer cove is lined with rocks, with trees and other vegetation growing close to the edge of the cove. The western inlet of the cove is in a more natural state, and the shore is rimmed with tidal wetlands. The main body of the cove is edged with tidal wetlands to the west and the north, while the developed residential area on the east is lined with rocks. There is also a small area of rocky shorefront, approximately 300 feet in length, on the western side of Palmer Cove.

South of Palmer Cove and Groton Long Point Road is the Esker Point Beach peninsula. There is a small beach on the western side of this point immediately south of Groton Long Point Road, while the remainder of the western side of the point, along with the southern tip and a portion of the eastern side, are classified as a modified bluff and escarpment. The remainder of the point consists of a sandy beach of approximately 4 acres.

West of Esker Point beach is a small residential area in which the shore has been classified as a modified bluff and escarpment. There is one small area of rocky shorefront near Noble Avenue, but the remainder of West Cove is classified as a modified bluff and escarpment. The southern point of the Noank peninsula consists of rocky shorefront, and the nearby Mouse Island and Whale State Rock are also classified as having rock shores. The eastern side of the Noank peninsula, as far north as the railroad crossing at the mouth of Beebe Cove, is also classified as modified bluff and escarpment. The southern portion of this area contains a large marina for pleasure craft, while the remainder consists primarily of residential uses, many with small docks. Many portions of this section of shore have been lined with rocks.

The majority of the Beebe Cove shoreline has also been classified as a modified bluff and escarpment, and contains areas of rock-lined shorefront. Some of the northern edges of the cove contain tidal wetlands, and all of Sixpenny Island has been classified as a wetland, with the exception of one small segment of sandy beach on the eastern side of the island. Willow Point, which is located north of Sixpenny Road, contains some residential uses and a marina, and is classified as a modified bluff and escarpment.

North of the Mystic River railroad crossing is a 1,500 foot length of shoreline which has been classified as developed. Uses in this area include the town landing, marinas, and various water-oriented commercial uses. Between West Main Street and Starr Street land use is primarily residential, and there is bulkheading along the river. The remainder of the shore south of the Route 95 overpass is either lined with rocks or contains tidal wetlands, while north of route 95 the shoreline consists primarily of tidal wetlands.

8. Intertidal Flats

Intertidal flats are defined in the CMA as "very gently sloping or flat areas located between high and low tides, and composed of muddy, silty, and fine sandy sediments and generally devoid of vegetation." These inertidal flats are generally less than 2,000 feet wide, and they serve a number of important functions:[22] they act as temporary nutrient traps; they can, on a limited

[22] Ibid., p. II-11.

basis, filter out pollutants; they are a specialized habitat for some marine invertebrates; and they provide vital feeding and resting grounds for migratory shorebirds. Due to their lack of vegetation the tideflats appear barren, but they support large populations of clams, crabs, and worms, which provide food not only for birds, but also for fish. It is the many filter-feeding invertebrates and micro-organisms which inhabit this area that provide the important natural filtering process for cleaning polluted waters.

There are three areas in Groton which contain intertidal flats, and these are not extensive. One intertidal flat of approximately 4 acres is located on the north side of Bushy Point Beach where the baymouth barrier joins the main portion of Bluff Point. The other two flats are located adjacent to Bluff Point on the western edge of Mumford Cove. One extends for approximately 800 feet along a small point of land, and the other intertidal flat extends for 1,600 feet along a narrow band of tidal wetlands.

9. Shellfish Beds

As defined on the state coastal management maps, shellfish concentration areas are those "geographic areas believed to support and produce significant concentrations of shellfish that are of commercial or recreational value; excluded are historically productive but presently inactive shellfish areas." The major shellfish inhabiting Groton's coastal waters are the hard-shell clam or quahog (Mercenaria mercenaria), the eastern oyster (Crassotrea virginica), and the bay scallop (Aequipecten irradians), along with some soft-shell clams, or steamers (Mya arenaria). The hard shell clam is a bivalve which lives close to the surface in sandy or muddy substrates, while the soft-shell clam burrows deep into the substrate, using a long muscular siphon tube to draw in water and food. The eastern oyster requires a hard substrate for attachment, as do young scallops. Bay scallops, which tend to inhabit areas with beds of eelgrass, are free-swimming as adults.

The shellfish beds in the Town of Groton are open only for recreational shellfishing; no commercial harvesting is allowed in town waters. Some clam and oyster beds are currently closed to shellfishing because of poor water quality; however, scallops may be harvested during the scallop season in any of the town's waters, since the edible portion of the scallop consists of a muscle, while the edible portion of clams and oysters includes the digestive tract, where pollutants may be concentrated.

There are beds of hard-shell clams in the Thames River adjacent to both the city and town of Groton. However, due to poor water quality, the Thames River is closed to shellfishing. Baker Cove is also a hard-shell clam concentration area, which is currently closed to shellfishing as a result of the sewage outfall from the airport's treatment plant. However, it is expected that in the near future the airport will tie in with the new sewer system in the area, after which the cove should open for shellfishing.

The Poquonnock River contains beds of hard-shell clams, along with some eastern oysters and bay scallops. The river was closed to shellfishing between May and October 1981 due to a fire which resulted in the leakage of pesticides into the river. Except for a small area at the northern end of the river, the Poqunnock waters were re-opened for shellfishing in November 1981. The area at the head of the river is closed to shellfishing due to high coliform counts in the water.

The hard-shell clam and eastern oyster beds in Mumford Cove are also closed to harvesting. The sewage treatment plant located north of the Penn Central railroad tracks discharges its treated sewage into Fort Hill Brook, which flows directly in Mumford Cove. The town has been ordered to find an alternative discharge method, and thus it is expected that the cove may be open to shellfishing within a few years.

Palmer Cove, which contains concentrations of both hard-shell clams and eastern oysters, is open to harvesting. The southern portion of the cove, below Groton Long Point Road, contains beds of hard-shell clams, while the northern portion, above the Penn central railroad tracks, along with the western-most inlet, contains both hard-shell clams and eastern oysters. The central portion of the cove, between Groton Long Point Road and the railroad tracks, contains no significant shellfish concentrations.

Both Beebe Cove and the Mystic River are currently closed to shellfishing as a result of the Town of Stonington sewage outfall located in Mystic. Shellfish beds in the Mystic River include hard-shell clams, eastern oysters, and some soft-shell clams.

10. Air Quality

There are four air quality control regions in Connecticut, with the Town of Groton located in AQCR 41, Eastern Connecticut. The Department of Environmental Protection operates an air monitoring network with sampling sites located in each of these regions. The pollutants monitored at these stations are as follows:

- Total Suspended Particulates (TSP) - any solid or liquid particle in the atmosphere; primarily a by-product of stationary sources such as industrial facilities

- Suflur Dioxide (SO_2) - a nonflammable, nonexplosive colorless gas; primarily from the burning of fuel.

- Ozone (O_3) - produced in the atmosphere by the reaction of nitrogen oxides and hydrocarbons in the presence of sunlight; production is greatest at high temperatures.

- Nitrogen Dioxide (NO_2) - a corrosive, reddish-brown gas which is a by-product of combustion.

- Carbon Monoxide (CO) - a poisonous, colorless, odorless gas produced during combustion; is generally a localized problem resulting from traffic congestion.

- Lead (Pb) - primarily from the combustion of leaded gasoline in motor vehicles.

Motor vehicles represent the most severe air pollution problem in Connecticut.[23] Carbon monoxide, nitrogen dioxide, hydrocarbons, and photochemical oxidants are all produced primarily by automobiles and other mobile sources. As a result, some of the most severe air pollution problems in the state occur in urban areas with heavy traffic volumes and problems with congestion.

The following air quality data has been taken from the 1978 Connecticut Air Quality Summary published by the Air Engineering Section of the Air Compliance Unit, Division of Environmental Quality, Connecticut Department of Environmental Protection.

The primary annual standard for total suspended particulates is 75 ug/m^3. Between 1967 and 1978, the level of TSP as measured at the Groton sampling stations ranged from 34 ug/m^3 to 102 ug/m^3. A high level of TSP, such as the 102 ug/m^3 measured in 1970, may be the result of heavy construction activity near the sampling station. TSP levels are also affected by the frequency of southwesterly winds, which transport particulates from the New York City area into Connecticut. During 1978, the maximum 24-hour TSP concentration in Groton was 129 ug/m^3, which is substantially below the 24-hour primary standard of 260 ug/m^3.

The state maintains 15 continuous sulfur dioxide monitors, with one located in the City of Groton at Fort Griswold State Park. The 1978 annual average of SO_2 at this station was 23 ug/m^3, which is in compliance with the primary annual standard of 80 ug/m^3. The maximum 24-hour concentration of SO_2, as measured in 1978, was 131 ug/m^3, which is within the primary 24-hour standard of 365 ug/m^3.

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[23]Allen Carroll, State of Connecticut Department of Environmental Protection: Developer's Handbook, N.D., p. 22

A new one-hour ambient air quality standard for ozone of .12 ppm was established by the U.S. Environmental Protection Agency in 1979. This standard is often exceeded in Connecticut, where ozone levels tend to be high during the summer. In the City of Groton in 1978, this standard was exceeded 27 times in five months, with .19 ppm being the highest recorded value.

The primary annual standard for nitrogen is 100 ug/m^3. Between 1973 and 1978, the NO_2 concentrations as measured at the Groton monitoring stations ranged from 38 ug/m^3 to 50 ug/m^3, well within the designated standard.

There are nine carbon monoxide monitoring stations in Connecticut, though none are located in the Groton area. However, at least 95 percent of the CO emissions in Connecticut come from motor vehicles, so the CO standards may be exceeded in any area where there are problems with traffic congestion.

Lead, which has a quarter-year standard of 1.5 ug/m^3, is an atmospheric pollutant resulting from the combustion of leaded gasoline. This standard was not exceeded in the City of Groton in 1978, where the quarterly averages ranged from 0.29 ug/m^3 to 0.66 ug/m^3, for an annual average of 0.48 ug/m^3.

11. Islands

Islands are another coastal resource which are identified in the CMA. Mouse Island, on which there are a number of houses, is a rocky island located southwest of the Noank peninsula. Whale Rock, which is located south of the peninsula, is also classified as an island. Other islands in Groton include a small island in Beebe Cove, and Sixpenny Island. The small island, which consists of approximately 0.5 acres, and Sixpenny Island, which consists of 35 acres, are both classified as tidal wetlands.

B. MANAGEMENT RESOURCES

1. Coastal Hazard Areas

The coastal hazard areas include those lands inundated during coastal storms or subject to erosion as a result of the storms, including flood hazard areas as defined in the National Flood Insurance Program, (100-year flood).

In Groton there are no coastal hazard areas along the Thames River; however the coastal hazard area extends over most of the airport and extends along Birch Plain Creek and both sides of the Poquonnock River. The flood hazard area extends around the shoreline to Mumford Cove, Palmer Cove, and around Noank to Beebe Cove, and up the Mystic River to the Ledyard town line, encompassing Sixpenny Island and Fort Rachel Place.

For exact location of the coastal flood hazard areas, see the coastal resources map.

2. Historic Resources

There are a few historic and cultural resources in Groton's coastal zone. The Village of Mystic is designated a historic district, regulated by the Town of Groton Historic District Commission, since January 1975. Within Mystic and Noank there are several individual residences which have been placed on the National Register of Historic Places. In addition, the villages of Noank and Mystic have been placed on the register as historic areas. The Mystic Art Association is listed by the town as a Cultural Point of Interest as is the Noank Historical Society. Historic Points of Interests in the coastal zone include the Winthrop Mansion Foundation on Bluff Point, the Railroad Midway-Round House, north of Bluff Point, the Clarke property, near Noank, and the Village Green in Old Mystic. The U.S.S. Nautilus has been nominated for placement on the National Register.

3. Shorelands

Shorelands are defined as those land areas within the coastal boundary exclusive of coastal hazard areas, which are not subject to dynamic coastal processes and which are comprised of typical upland features such as bedrock hills, till hills, and drumlins.

Most of the town's coastal boundary is comprised of shorelands. Along the Thames River the entire area is shorelands. Along Long Island Sound the shorelands exclude the airport and the land immediately adjacent to Birch Plain Creek, the Poquonnock River, Mumford Cove, and Beebe Cove.

The major undeveloped shorelands are Bluff Point State Park, Haley Farm, and portions of River Road. The remainder of the coastal area is largely developed in residential or commercial use.

III. Facilities and Resources of National Importance

FACILITIES AND RESOURCES OF NATIONAL IMPORTANCE

The coastal management act requires that Facilities and Resource Uses of National Importance be given adequate consideration in the municipal coastal program. This consideration means that the facility may not be excluded from the coastal zone without reasonable grounds. These grounds are defined as (i) may reasonably be sited inland of the coastal boundary, (ii) fails to meet all applicable federal and state environmental, health, and safety standards, or (iii) unreasonably restricts physical or visual access to coastal waters.

The Town of Groton contains several natural resources of national importance. These include tidal wetlands, shellfishing areas, water pollution control measures, air pollution control measures, federal navigation channels and basins, and state-owned natural wildlife areas, all of which are discussed in section II of this document, Coastal Land and Water Resources. In addition the town contains a man-made facility of national importance, the submarine base on the Thames River. There are no plans or recommendations in the town's coastal program to exclude or restrict any of these facilities or resources from Groton's coastal zone.

IV. Existing Land Use Policies and Regulations

EXISTING LAND USE POLICIES AND REGULATIONS

The following analysis examines the existing land use within the coastal area and notes possible conflicts with the Plan of Development and the zoning ordinance. These are examined on a site specific basis in order to determine where particular changes may be needed.

A. CURRENT PLAN OF DEVELOPMENT

1. Description of Land Use and Current Plan of Development

The current Plan of Development (POD) was adopted in November 1973 with amendments to March 1981. The plan recommends a variety of uses within the coastal zone including varying density residential, commercial, and industrial.

Residential areas in the coastal zone are designated low density, moderate density, townhouse residential, multi-family, and rural density. Commercial areas are designated general commercial and professional offices. In addition, there are a few industrial areas and parcels designated public facilities, recreation and open space, and natural resources.

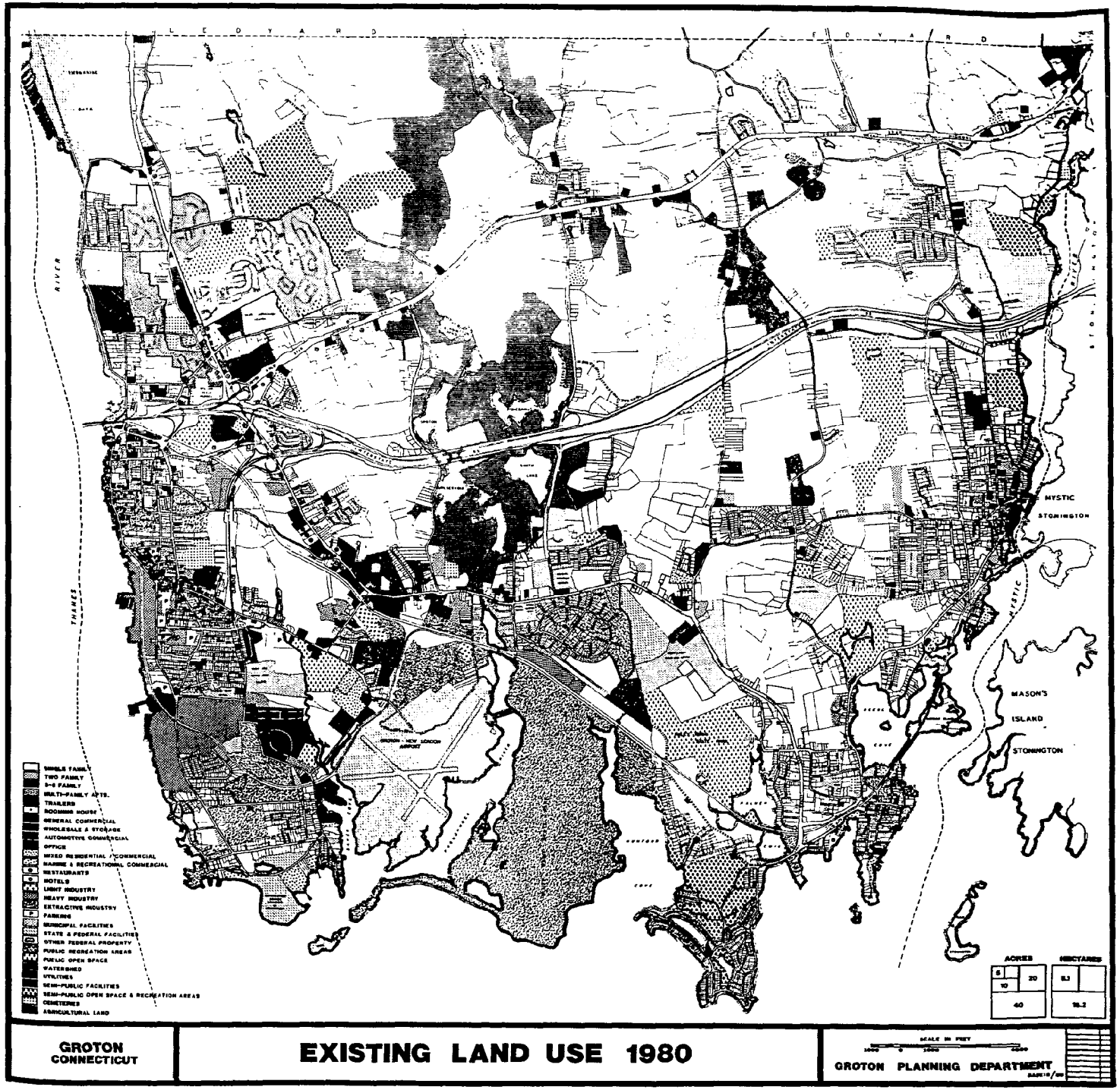
In addition, there are areas of public and semi-public uses which include institutions and parks.

In the area along the Thames River, the developed areas are composed of single family residential uses and the Odd Fellows Home. There is one large tract of open space. The area is designated for moderate density development except for the Odd Fellows Home which is designated recreation and open space.

In the coastal area north of the airport, the area is a mixture of commercial development and some residential, plus the watershed area, north of Poquonnock Road, and some of the area is designated recreation and open space. Further east, there are tracts of industrial land around the railroad. North of the railroad the land use is a mixture of residential -- single family and multi-family -- and commercial. In these areas, the Plan of Development conforms with the existing land use.

South of the railroad tracks and to the east of the Poquonnock River is Bluff Point State Park, designated as recreation and open space on the Plan of Development. To the west of the Poquonnock River is the Groton-New London airport which is shown as a public facilities area on the Plan of Development.

Along the Mystic River north of I-95, there is some single family development, designated a mixture of low and rural density and natural resources on the Plan of Development. The Mystic Educational Center, designated as a public facility and a large


GROTON
CONNECTICUT
EXISTING LAND USE 1980
GROTON PLANNING DEPARTMENT
MYSTIC
STONINGTON
MASON'S
ISLAND
STONINGTON
THAMES
RIVER
SINGLE FAMILY
TWO FAMILY
3-4 FAMILY
MULTI-FAMILY APTS.
TRAILERS
ROOMING HOUSE
GENERAL COMMERCIAL
WHOLESALE & STORAGE
AUTOMOTIVE COMMERCIAL
OFFICE
MIXED RESIDENTIAL / COMMERCIAL
MARINE & RECREATIONAL COMMERCIAL
RESTAURANTS
MOTELS
LIGHT INDUSTRY
HEAVY INDUSTRY
EXTRACTIVE INDUSTRY
PARKING
MUNICIPAL FACILITIES
STATE & FEDERAL FACILITIES
OTHER FEDERAL PROPERTY
PUBLIC RECREATION AREAS
PUBLIC OPEN SPACE
WATERSHED
UTILITIES
SEMI-PUBLIC FACILITIES
SEMI-PUBLIC OPEN SPACE & RECREATION AREAS
CEMETERIES
AGRICULTURAL LAND
ACRES
HECTARES

recreation area shown as such on the Plan of Development, make up the remainder of the land use in the area.

Further south along the Mystic River, the area is built up with single family and two family development being the predominant uses, along with the waterfront commercial area associated with the Village of Mystic. In addition, there are some large areas of open space. On the Plan of Development, most of the area is designated low and moderate density with the exception of the waterfront design district and a few areas of recreation and open space.

South of Sixpenny Island and along the Long Island Sound, most of the area is single family development, designated low density and moderate density residential development. The major exceptions to this are marina complexes, limited commercial areas within Noank village and Haley Farm State Park.

2. Conflict Analysis

a. Thames River, south of Crystal Lake Road to Grove Avenue

Along the Thames River, the Plan of Development designates most of the area as moderate density development. The development of the U.S.S. Nautilus as a tourist area on the Thames waterfront, is likely to have a major impact in the area. It is therefore suggested that the area immediately adjacent to the new development be designated tourist commercial in order to reflect the future development in the area. It should be noted that the attraction of the U.S.S. Nautilus, is expected to generate new commercial development outside the coastal boundary, along Route 12, so that the Plan of Development designation of tourist commercial should be considered for extension to this area. This designation would be tailored to tourist commercial activities and promote a high quality service area.

The area on which the Odd Fellows Home is situated is designated recreation and open space. While it is expected that the existence of the home will continue for the near future, eventually this area may be developed for more intensive use. It is therefore recommended that the Plan of Development be amended from recreation and open space to reflect this property's potential and to conform with the surrounding area -- the new designation being that of moderate density residential.

There has been some thought expressed to developing the waterfront along the Thames River, between the River and the railroad, as it could provide an opportunity for various water-dependent uses which could take advantage of the

availability of different transportation modes. The feasibility of using this land for this purpose is beyond this project's scope, however it should be reserved for future consideration. One example of future use would be to develop shoreline facilities for nearby marine or water-related use development or expansion from the City of Groton. However, the present designation of open space on the Plan of Development, should be retained.

b. Birch Plain Creek to Poquonnock River

The Plan of Development indicates an area of natural resources west of the airport. The existing land use is presently a mixture of residential, commercial/office, semi-public, commercial, and vacant property. The area is zoned IA-40, CB-15, CA-12, and RU-20. The only sensitive part in the area is the land adjacent to Birch Plain Creek which is designated recreation and open space. The natural resources designation on the Plan of Development west of Thomas Road appears to be misplaced and should be changed to an industrial classification along with other land adjacent to Thomas Road, excluding the tidal wetland area. The area at the northern corner of High Rock Road and Poquonnock Road, presently designated moderate density residential in the Plan of Development, and zoned commercial, should be considered for Professional Office designation.

The large tract north of Trail's Corner which is designated natural resources, appears to be mislabeled since a natural resource designation does not denote future land use designation. It is recommended that the area be changed to moderate density residential on the Plan of Development, while maintaining selected areas having severe resource limitations.

The area designated as moderate density residential, located south of the intersection of Tower Avenue and High Rock Road should be redesignated to reflect current use and its proximity to the airport industrial complex. Therefore, it is recommended that this area be redesignated to industrial.

An area just north of the airport, on state property, is a sensitive wetland area which will be considered for natural resource designation.

c. Poquonnock River East to Mumford Cove

The area generally north of Lilly Lane and southeast of Fort Hill Homes is moderate density residential and should be reconsidered for townhouse residential. This would allow an

alternative form of housing at a density which is consistent with the Fort Hill area.

The area east of Depot Road and north of Industrial Drive is inappropriately designated open space because it has not been slated for acquisition by the town. Therefore, it should be designated as moderate density to conform with the Fort Hill area.

d. Mumford Cove East to Noank (Brook Street)

The area north of Mumford Cove Estates and south of the railroad line should be redesignated from natural resource to recreation and open space so that it is preserved as per the original subdivision plan.

The large waterfront commercial areas, one on West Cove and the other on the Mystic River side of the peninsula, designated on the current Plan of Development as general commercial should be changed to reflect their relation to the water. Therefore, it is recommended that they be redesignated a new category, marine commercial/recreation. This new category, marine commercial/recreation would be substituted for the existing marine recreation designation. This designation would encourage water-dependent uses such as marinas, commercial/recreational fishing and shellfishing and associated marine equipment sales.

e. Noank (Brook Street) to Willow Point (School Street)

The area currently designated as waterfront design district on Willow Point should be reclassified as marine commercial/recreation, and the waterfront design district should be eliminated as a designation in the Plan of Development, as it is essentially a zoning designation.

f. Mystic/Fort Rachel Neighborhood

Refer to Chapter VII for a review of this area.

g. North of Mystic to I-95

No changes recommended in the Plan of Development.

h. I-95 to Route 184

No changes recommended in the Plan of Development.

B. CURRENT ZONING

1. Description of Zoning

The existing zoning regulations were adopted in March 1979 and amended in April 1981. It should be noted that the Noank area is independently controlled from a zoning standpoint. The Noank Zoning Commission controls this area while the Town of Groton Zoning Commission controls the remainder of the coastal area covered by this plan.

Residential uses are divided into single family, two family and multi-family (as a conditional use). Commercial uses allow entertainment and recreation uses, financial and government uses, wholesale and retail trade, and personal services. In addition, the waterfront district allows yacht clubs and marinas. Industrial uses allow transportation and communication facilities, food manufacturing, textile mill products, wood, paper and printing operations, and chemical and metal production.

The coastal area along the Thames River is zoned R-12, single family residential and RS-12, single and two family residential, with one area zoned multi-family development.

North of the Groton-New London airport, much of the area is zoned industrial with some commercial and residential zones at the northern end of the Poquonnock River. To the east of the river at Bluff Point State Park, the area is zoned RS-20, single family development, while on the west side of the river at the airport, the area is zoned IB-80, industrial and to the west of the airport, IA-40, industrial.

The area along the Mystic River north of I-95 is zoned RU-20, one and two family residential, while south of I-95 it is zoned RS-20, single family residential. Further south on the Mystic River, the area is zoned residential, one and two family homes with the exception of the waterfront design district south of Route 1.

The remainder of the coastal zone around Palmer Cove and Mumford Cove is zoned residential except for two small areas zoned waterfront commercial.

2. Conflict Analysis

a. Thames River, south of Crystal Lake Road to Grove Avenue

The development of the U.S.S. Nautilus will bring large numbers of visitors to the area and will undoubtedly result in new commercial development to serve such visitors. In order to control the resultant development, it is

recommended that a new zoning classification, tourist-commercial, be established that will regulate the type of development that will take place in the area.

b. Birch Plain Creek to Poquonnock River

As discussed above, the area adjacent to Birch Plain Creek is zoned IA-40. In order to protect the sensitive area adjacent to the Creek, the zoning should be changed from industrial to low density residential, for example, minimum lot area should be 80,000 square feet.

The area at the northern corner of High Rock Road and Poquonnock Road, presently zoned CB-15, should be zoned to OMF (Office/multi-family) which allows both one and two family housing, multi-family as a conditional use, as well as professional offices. This concept is recommended so as to centralize intensive commercial development within the downtown area.

The small commercial zone, CB-15, to the west of Poquonnock River, north of the railroad, is designated moderate density residential and its existing land use is a mixture of single family development, a truck terminal, and a small park. It is suggested that the area be rezoned residential, R-12, to reflect the existing land use, the Plan of Development, and to ensure that the zoning designation will not jeopardize sensitive coastal resources.

c. Poquonnock River East to Mumford Cove

The northern section of Bluff Point State Park is zoned 1C-40 while the remaining area is zoned RS-20. In order to ensure preservation of the state park, there are two options open to the town. The town could create a zone of open space and zone the entire park in this manner. However, this could lead to some legal complications in the future, not so much from zoning state-owned land as open space, but the creation of such a zone may lead to attempts to extend it in the future to other areas in the town. An alternative solution would be to zone the entire area as low density residential, in order to protect the area with the knowledge that any development in the area would require a coastal site plan review. Because no utilities exist and because of the existence of sensitive coastal resources, a zoning designation having a minimum lot size of 120,000 square feet appears to be reasonable.

d. Mumford Cove East to Noank (Brook Street)

Zoning recommendations for this area will be forthcoming

after the entire Noank village is examined in a future Plan of Development report.

e. Noank (Brook Street) to Willow Point (School Street)

The same treatment proposed for Bluff Point should be considered for the Beebe Pond area.

f. Mystic/Fort Rachel Neighborhood

Refer to Chapter VII for a review of this area.

g. North of Mystic to I-95

No zoning changes are recommended for this area.

h. I-95 to Route 184

The residential RU-20 zone along the Mystic River allows development on half acre lots. At present, the area is not sewered and there are no plans to extend the sewer system to this area, as the area has significant resource limitations for small lot development. It is therefore suggested that the zone be changed to permit only large lot development in order to provide sufficient room for future leaching fields from septic systems. This rezoning should minimize future problems related to concentrated development. Minimum lot size recommended is 80,000 square feet.

General Zoning Changes

In addition to specific parcels, new requirements can be added to existing residential, commercial, and industrial zones. Greater setbacks from the water's edge and wetlands, requirements for livable areas of buildings to be above the coastal flood hazard area, methods of construction to be required that can withstand strong winds, maintenance of a percentage of open space to be required from the road through to the water so that some visible access to the shorefront is maintained, are examples of modifications that can be made in residential zones. In addition, commercial and industrial development can be regulated through controls over waste disposal, runoff, parking requirements as well as setbacks and open space conditions similar to those in residential zones.

The coastal site plan review requirements of the Coastal Management Act will be incorporated into the zoning regulations.

C. OTHER REGULATIONS AND PLANS

1. Economic Development Policy Statement

In June 1981, the Groton Town Council adopted the Economic Development Policy Statement (EDPS) which identified several goals, actions and policies which the town should pursue in order to further its economic development. Some of these goals are in agreement with the objectives of the coastal task force, while others may result in a conflict of objectives which will have to be resolved.

The basic conclusions which the EDPS cites are that if present development trends continue, it is anticipated that local taxes will increase at a rate of 10-12 percent annually in the foreseeable future unless services are reduced. In addition, the report adds that it is anticipated that total non-local tax revenue sources will not proportionately maintain the same level of increase as they have over the last ten years. Therefore, the town will become more dependent on local tax revenue required. The report concludes that this tax revenue will either be raised from higher taxes and/or an increased net taxable grand list.

The report describes the town's overall goal as economic development (including tourism, commercial and industrial) which will strengthen the town's tax base, income base and job base. This goal, the report adds, should be actively encouraged and fostered by the town and its policy-making bodies.

In order to accomplish this goal, the report makes several recommendations:

a. The town should determine the feasibility of developing the 39± acre Groton-New London Airport parcel identified as surplus, and land immediately adjacent thereto into an industrial area. The report notes that the area in the northwest corner of the airport is highly suitable for industrial development containing good access, stable building material, utilities and rail transportation. However, the area west of the airport which abuts Birch Plain Creek and is zoned IB-40 (light industry), the report suggests, has little usage as an industrial area with today's development requirements and environmental restrictions.

b. Tourist-oriented commercial activity (including recreation and historical/cultural development) should be recognized as an important part of Groton's economic base, augmenting existing commercial activity and the town should encourage its full development.

The report recognizes that the tourist industry in Groton is becoming an increasingly large segment of the local economy and, as a result, it is necessary that the importance of this growing industry be recognized and developed properly. The report adds, "there has been little effort on the local or regional level to tie together tourist resources either through the promotion of package tours or the development of a central theme that would promote Groton as a primary destination point for tourists."

The coastal management program encourages public access to the coast and its resultant tourist trade. The promotion of Groton as a tourist center can be encouraged under the coastal program so that tourists will be drawn to parts of the town other than Mystic, where tourism has resulted in traffic congestion.

One suggestion by the coastal task force which echoes that of the EDPS report is the promotion of the U.S.S. Nautilus as a major tourist attraction. In addition, the coastal task force suggested the establishment of a ferry service between the memorial and New London. The EDPS report suggests that the town should actively and aggressively help to develop the U.S.S. Nautilus into a premier tourist attraction. "It is recommended that a local committee be established whose main function would be to ensure that this attraction is developed in a way which is in the best interests of the Town. This committee should, at a minimum, represent the Planning, Zoning and Economic Development Commissions and the Town Council."

The EDP report also has several specific suggestions for the promotion of tourism. These suggestions are: establish an economic development commission subcommittee whose main responsibility would be the further development of the town's tourism, recreational and historical resources; develop a tourism development plan which would identify local tourist utilization, identify their priority development, spell out a town-wide promotion program, and identify programs that would maximize economic benefits of tourist resources; support the establishment of a National Maritime Historic Park along the Thames River; support the regional efforts of the Southeastern Connecticut Chamber of Commerce, Thames River Development Corporation, and others in their efforts to fully develop the region's tourist potential; support the establishment of a submarine museum at the U.S. Submarine Base in Groton at Goss Cove. In addition, the EDP report suggests that the Town examine the feasibility of intensifying the use and development of water-related development along the Thames and Mystic Rivers

and the Sound in keeping with the Coastal Area Management Program guidelines.

c. The future industrial and commercial development of the town are of prime interest to the EDP report. The report recommends that the town conduct a thorough review of all industrial and commercial land use opportunities within the town and make needed recommendations based on the policy statement. The report adds that this review should be undertaken by the Planning, Zoning, and Economic Development Commissions jointly. As far as new development in the coastal zone is concerned, any new commercial and industrial development would be reviewed by coastal site plan review and thus would have to satisfy adopted coastal policies.

Recommendations in the EDPS that affect the coastal zone include the following:

"The IC-40 area south of the railroad tracks in the Bluff Point area is State property and not developable at this point in time." As noted earlier in this discussion, the area abutting Birch Plain Creek and zoned IB-40 (light industry) may also be an area more suited to an alternate use. "The IC-40 area north of the railroad tracks in Fort Hill is presently being utilized, though not to its potential. Limited expansion of this zone may be possible...to provide a marketable, heavy industrial development site."

d. As part of encouraging development within Groton, the EDP report recommends the simplification of the permit process and approvals from local government bodies. The report suggests that consideration should be given to the consolidation of agencies and commissions for (i) review and permit procedures; and (ii) planning, zoning and wetlands. To the extent that this may affect land use decisions within the coastal zone, this recommendation should be of concern to the coastal program. As part of this recommendation, the EDP report suggests that specific zoning regulations should rely more heavily on performance standards as opposed to those that are hard and fast. Although these recommendations were geared towards industrial and commercial activities, they could equally be applied to development within the coastal zone in order to regulate problems of runoff and flooding caused by new development.

2. Old Town Beach Study

Linked to the encouragement of tourists is the issue of expanding

access to the beaches in the town, especially to the Old Town Beach. This issue was examined in detail by a study conducted by the Connecticut Department of Environmental Protection (DEP). The DEP proposal suggested the construction of a 21 foot wide bridge to provide pedestrian, bicycle, and emergency vehicle access to the beach.

The town's open space component of the 1979 Plan of Development is also in favor of such a proposal. "The State is...reviewing proposals for a method for renewing access to the former Town Beach on the airport property. The Town should take a strong position in favor of regaining access to this beach." The same plan also notes, "although the town owns several pieces of waterfront property with sandy beaches, as does the State, in general the access to the beaches and good swimming facilities in the town is limited. Most of the unrestricted good beach areas are located at the southern end of Bluff Point." The Plan of Development proposes the use of selected areas of the reservoir for swimming facilities, but for those who wish to swim from the beach, good swimming areas are lacking.

As part of promoting the areas that are available, the Plan of Development suggests that "increased publicity and awareness (of the beaches) will help boost the town's image to visitors as well as residents...The preparation of a flyer with a map showing the more important recreational areas could be placed at popular tourist areas for free distribution to the public."

3. Wetland Statutes and Regulations

Connecticut has legislation for both tidal wetlands and inland wetlands. The state's tidal wetland statutes, which have been in effect for more than ten years, declare that many of Connecticut's tidal wetlands have been destroyed by unregulated activities, and therefore, it is "the public policy of this state to preserve the wetlands and to prevent the despoilation and destruction thereof."

In addition to the tidal wetland statutes, Connecticut also has tidal wetland regulations, which became effective in August, 1980. Activities which require permits under these regulations include draining, dredging, excavation, dumping, filling, erecting structures, driving piles, or any obstruction of a wetland, whether or not it effects the tidal ebb and flow. The permit procedure for such activities includes completion of a detailed application, publication of a notice, and an optional public hearing. The regulations include a set of criteria to be used by the Department of Environmental Protection (DEP) in making a decision concerning an application for a regulated activity. The

criteria include consideration of: recreational and navigational uses; erosion and sedimentation; fish, shellfish and wildlife; circulation and quality of tidal waters; flood control functions; and overall wetland quality.

To provide guidance to prospective applicants, the regulations also include details on types of activities which are generally compatible or incompatible. With certain restrictions, the following activities are generally considered compatible with tidal wetland preservation: the placement of small piers and catwalks; placement of pipes and cables; stormwater drainage structures; and the erection of water dependent industrial and commercial facilities. Activities which are generally incompatible include: filling; excavation; the construction of shoreline stabilization structures; the construction or repair of tidal gates; the construction of commercial or industrial facilities which do not require water access; and the construction of water dependent facilities on fill.

The Connecticut statute governing freshwater wetlands, which was passed in 1972, is the Connecticut Inland Wetlands and Water Courses Act. This act defines wetlands as "land, including submerged land, not regulated pursuant to Sections 22a-28 to 22a-35 (tidal wetlands) which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial and flood plain by the National Cooperative Soils Survey." Under this act, the following activities are allowed, as of right: grazing and farming; a residential home for which a building permit has been issued; boat anchorage or mooring; uses incidental for the enjoyment and maintenance of residential property; construction and operation of water supply facilities; conservation activities; and outdoor recreation facilities and activities, where otherwise legally permitted. Regulated activities, which require an application for permit, include any uses other than those listed as allowed, which involve "removal or deposition of material, or any obstruction, construction, alteration or pollution of such wetlands or water courses."

4. Flood Hazard Regulations

Groton is a member of the National Flood Insurance Program (NFIP), which is a program administered by the Federal Emergency Management Agency (FEMA) to provide flood insurance to property owners in participating localities. There are two phases in the NFIP, the emergency phase and the regular phase. The regular phase of the program is based on a Flood Insurance Rate Map (FIRM) which shows the boundaries of flood hazard areas and anticipated flood levels within them. The emergency phase of the program relies on a less precise Flood Hazard Boundary Map (FHBM) which shows the approximate boundary of the 100 year floodplain.

Groton is a member of the regular phase of the NFIP and, as such, has been issued a detailed FIRM. This map designates a base flood (100 year flood) elevation of 11 feet m.s.l. for the special flood hazard areas in the town.

To ensure eligibility for continued participation in the NFIP, the Town of Groton has passed a floodplain management ordinance as part of its zoning regulations. This ordinance establishes policies and permit requirements related to land use and development in those parts of the town designated as special flood hazard areas. Some of the major requirements for activities in coastal hazard areas include:

-- All new construction shall be located landward of the reach of mean high tide.

-- All new construction or substantial improvements shall be elevated on adequately anchored pilings or columns so that the lowest floor is elevated to or above the base flood level.

-- No fill shall be used as structural support for buildings.

-- There shall be no alteration of sand dunes which would increase potential flood damage.

-- The placement of mobile homes shall be prohibited outside existing mobile home parks and subdivisions.

Requirements for other, non-coastal flood hazard areas include:

-- All new construction and substantial improvements shall be designed and adequately anchored to prevent flotation, collapse, or lateral movement.

-- New construction or substantial improvement of any residential structure shall have the lowest floor, including the basement, elevated to or above the base flood level.

-- New mobile home parks or their expansion shall have stands or lots elevated on compacted fill or on pilings so that the lowest floor of the mobile home will be at or above the base flood level.

These regulations, which took effect in March 1979 with the adoption of the zoning ordinance, are consistent with the regulations of the National Flood Insurance Program.

V. Coastal Issues and Problems

COASTAL ISSUES AND PROBLEMS

A. WATER-ORIENTED

1. Maintenance of Navigation Channels: Along the Mystic River, the demand for mooring space has led to the encroachment of moored boats into the navigation channels. A plan for a mooring system needs to be developed with some identification of areas available for moorings.

2. Dredging of Navigation Channels: A uniform policy to control dredging and filling should be established for the Groton waterfront which examines the effects of dredging in different areas and on several projects. The Poquonnock River, Mumford Cove, West Cove and the Mystic River are all areas of concern.

3. Shellfishing Areas: Several areas in Groton are closed to shellfishing because of sewage treatment plants in the area. Baker Cove is presently closed to shellfishing but will reopen after the airport is tied into the sewer system. The Poquonnock River has bay scallops and quahogs, and oyster grounds above the bridge. However, the opening of the river is being slowly filled by sand. Palmer's Cove has oyster grounds above the bridge, however, the growth of eel grass is restricting the fishing areas. West Cove is closed to shellfishing due to siltation. Mumford Cove is closed to shellfishing due to the sewage treatment outfall. Beebe Cove, off the Mystic River, is also closed because of wastewater problems. There is no program to test the sewer system or to tie shorefront housing into the sewer system in order to control pollution. The reopening of marginal shellfish beds should be discussed with the State, and consideration should be given to a unified approach to dredging the Town's coastal waterways.

4. Ferries: The establishment of a limited ferry service between peripheral parking areas north of I-95 and the Mystic Seaport may alleviate parking problems in the area.

5. Water Quality: Due to siltation problems, there is poor water quality in the public swimming areas at the existing town beaches.

6. Thames River: The waterfront along the Thames River should provide water-oriented commercial facilities if it is to be developed.

B. WATER'S EDGE

1. Marina Development: Prohibit expansion of existing boating facilities or new marinas or boat yards north of the Route 1 drawbridge, on the Mystic River. The Mystic River has a limited capacity to accommodate marinas. On the Thames River, there is a need for more public boat launch areas.

2. Docks and Piers: There should be consideration given to limiting construction of docks, piers, bulkheads and fill on the Mystic River to include only those improvements necessary to maintain the existing shoreline.

3. Moored Watercraft: Partially sunken or sunken barges are moored by the water's edge at the Fort Rachel waterfront create a blight on the area. Unregulated houseboat development should be discouraged, because of health and navigation factors. These craft should be controlled.

4. Beaches: Access to town beaches should be publicized and improved, especially to the Old Town beach whose access was cut off with the installation of the instrument landing system at Groton-New London Airport.

5. Visual Access to the Water: Multi-family housing, including condominiums, adjacent to the water blocks views of the waterfront.

6. Public Access to the Water: Access to the waterfront both at beaches and in built-up areas should be available to residents.

7. Erosion: Erosion of the shorefront and adjacent wetlands will eventually cause property damage to buildings on the shoreline. A buffer between construction and erosion areas and wetland areas may prevent property damage and preserve wetlands.

8. Waterfront Uses: Some waterfront uses can overload inland support systems such as boat trailers passing through narrow streets over the summer.

C. LAND USE

1. River Road: The most frequently mentioned land use issue is the conservation of the area along River Road adjacent to the Mystic River. While several groups have advocated enacting a conservation zone, there are several legal problems with this approach as it denies reasonable use of the land by existing owners. One alternative is to zone for large lot zoning, but large lot acreage must be justified by soil conditions, health standards for wells and septic systems, etc. A second alternative might be to zone the area for agricultural use, but this requires that the land be both suitable for agriculture and that some potential market exists.

2. Downtown Mystic: In order to relieve travel congestion in downtown Mystic, several suggestions have been proposed. Improved signage for parking in order to prevent traffic from proceeding over the bridge while looking for a parking space is one suggestion. Alternatively, running a mini-bus from I-95 to

the downtown area may sufficiently alleviate traffic. Additional recommendations will be developed as part of a detailed study of Mystic and Fort Rachel Place.

3. Walkways and Bikepaths: Create coordinated walkways and bikepaths along the shore.

4. Marshes and Wetlands: Amend the Zoning Regulations to prohibit future building on tidal marshes. Regulate the use of land immediately adjacent to tidal and inland wetlands.

5. Commercial Development: Commercial buildings in the Village of Mystic should be prohibited from encroaching into existing residential neighborhoods.

6. Open Space: Preserve the Fish Farm, Sixpenny Island, Bluff Point, and Fort Rachel Place as open space. Establish conservation zones along Upper Mystic River and Poquonnock River.

7. Sewers: Create a septic system testing program along the shorefront and require sewer connections for all properties adjacent to the river where available. There should be some protective device at sewer pump stations to permit retention during breakdowns.

8. Nautilus Memorial: The development of the Nautilus Memorial, is a high-priority concern. It will become a large tourist attraction, but parking is limited. Perhaps access by water and by rail should be promoted.

9. Industrial Park: Development of the industrial park near the airport should have some zoning regulations attached to prevent any discharge of chemicals and bulk waste into the Poquonnock River, and Baker's Cove.

10. Road Maintenance: Ensure that sand scattered on the road during the winter to prevent skidding does not run into wetlands or coves. The installation of retention basins would alleviate this problem.

11. Residential Construction: Establish standards, such as providing public access as a mitigating measure, for new residential construction adjacent to the water, or require the retention of as much visual access as possible.

12. Airport: Recommendations to expand the airport and to restrict its expansion have been made. These conflicting policies have to be resolved.

13. Setbacks: Setbacks for residential development adjacent to the water have been suggested, in order to protect property from severe storms and erosion.

14. Mixed-use Development: Groton's waterfront design district, which allows mixed commercial and residential development, should be expanded.

VI. Coastal Policies

COASTAL POLICIES

A. RELATIONSHIP BETWEEN STATE AND LOCAL POLICIES

The development of the following policies for Groton's municipal coastal program represent the goals and objectives for the future development and protection of the coastal zone. They indicate the special concerns and problems peculiar to Groton, but are in addition to and complement the state coastal policies. They should not be regarded as an alternative to the state program. For this reason, policies that are covered by the state program are not included in Groton's coastal program. Any future development within the Groton coastal zone must satisfy both state and local policies, once the latter are adopted.

B. COASTAL WATERS

1. Encourage the maintenance of existing navigation channels along the coves and rivers to ensure access remains open by developing a plan for a mooring system, and land-related marina complexes, in heavy boating areas such as the Mystic River.

2. Upgrade the coves, rivers and bays along the coast so that they can be better used for recreation and fishing, including protection against wastewater discharge and spills associated with public sewer systems.

3. Improve water quality and reduce water pollution by requiring new development adjacent to the water to tie into the existing sewer system where available. Encourage a survey of existing sewage disposal problem areas.

4. Develop a timetable with the state to reopen marginal shellfish beds.

5. Prohibit degradation of scenic views on the Mystic River and other areas by offering incentives to developers in exchange for preservation of views.

6. Encourage the development of an overall policy and plan for control of dredging and filling in coastal waters.

7. Encourage control of marina expansion in heavy use areas, in order to regulate traffic and other impacts on the land and on the water.

8. Control houseboats to the greatest extent practical, strongly discourage houseboat locations north of Route 1 on the Mystic River.

C. OPEN SPACE AND RECREATION

1. Preserve the open character of the Mystic River by limiting development in certain areas.

2. Increase public access to waterfront areas including recreational boating and fishing access to the shore and navigable waterways. Public and private development projects should be considered in relation to this concept and encouraged to promote it.

3. Improve public use of the waterfront by actively pursuing new facilities and expanding existing facilities for recreation, specifically beaches, encouraging public access to the waterfront in built-up areas, and requiring clean-up of derelict structures and debris from the water's edge.

4. Encourage the creation of walkways and bikepaths along the shoreline.

5. Preserve sensitive coastal resources such as tidal marshes, beaches and dunes, bluffs, and the river's edge.

6. Encourage the development and maintenance, once developed, of the U.S.S. Nautilus as a major high quality tourist attraction while minimizing adverse impacts on the coastal area.

7. Encourage the state to maintain Bluff Point in the manner stated in Special Act No. 75-45, and to discuss with the town any modifications planned in the area.

D. RESIDENTIAL

1. Encourage clusters and setbacks for new residential development along the water's edge, to protect environmentally-sensitive areas.

2. Establish standards for new residential construction that retain maximum visual access to the water.

3. Encourage new residential development in existing developed areas, so as to encourage development in areas serviced by utilities.

4. Retain the existing residential character of "village" neighborhoods, and the ratio of land in residential use in these areas.

E. TRANSPORTATION

Encourage the improvement of public transportation in the coastal zone by bus, train, and ferry service.

F. COMMERCIAL AND INDUSTRIAL

1. Improve access to the Mystic area by encouraging increased public transportation to the area.

2. Preserve the existing historic character of downtown Mystic.

3. Prevent the degradation of water quality where new industrial development takes place within the coastal zone. Review potential discharge and containment of industrial waste and drainage through the coastal site plan review process, to ensure compliance with applicable federal and state environmental health and safety standards.

4. Discourage the physical expansion of the Groton-New London Airport.

5. Encourage economic development adjacent to the airport.

6. Give high priority and preference to water-dependent industrial and commercial uses and facilities in existing developed and non-sensitive shorefront areas.

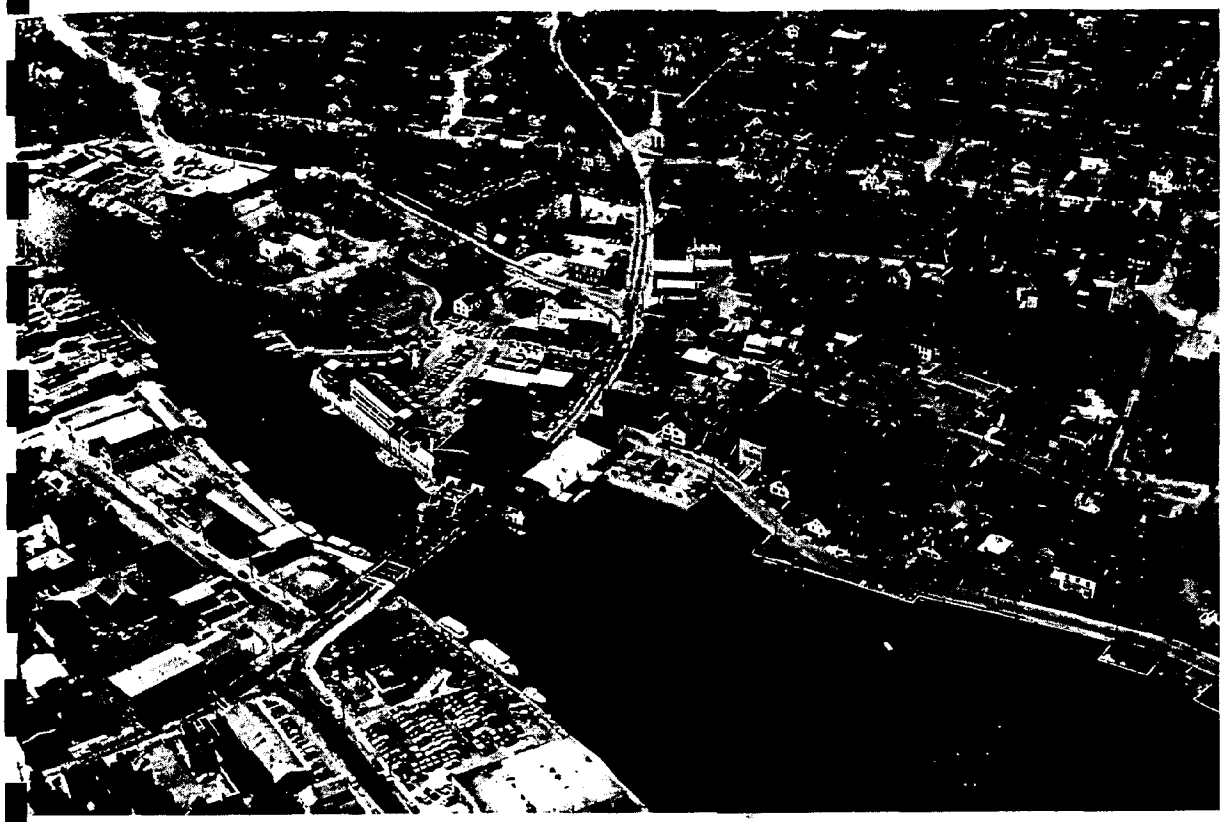
VII. Mystic and Fort Rachel Place

MYSTIC AND FORT RACHEL PLACE

A. INTRODUCTION

The Village of Mystic and the adjacent Fort Rachel Place area exhibit special features which warrant separate consideration in the Municipal Coastal Program. These features include the historic character and value of the area, the increasing pressure for waterfront development, the growth and success of the commercial area and the resulting pressures for expansion into neighboring residential areas, parking and traffic problems, and the future potential of the largely undeveloped Ft. Rachel Place area.

The initial steps of the Mystic/Fort Rachel Place study were undertaken by the Town in 1981, and included a detailed analysis of land use, building conditions, ownership patterns, traffic and parking considerations, zoning and Plan of Development recommendations. This process, combined with a series of meetings with Mystic and Fort Rachel Place residents, resulted in the identification of issues and problems in the area. The discussion of the issues formed the basis for the creation of general policies and objectives and more specific recommendations for the Mystic-Fort Rachel Place area.



Aerial View of Mystic

Aerial View of Fort Rachel

B. EXISTING LAND USE, POLICIES AND REGULATIONS

1. Existing Land Use

The Mystic-Fort Rachel area is essentially a residential community with a thriving commercial center and waterfront marina area. The shorefront north of the Route 1 drawbridge is for the most part private open space, and thus preserved in a natural state. The riverfront, from just north of the drawbridge to near the Penn Central railroad embankment is classified as developed shorefront, and contains a number of marinas and docks, as well as other uses.

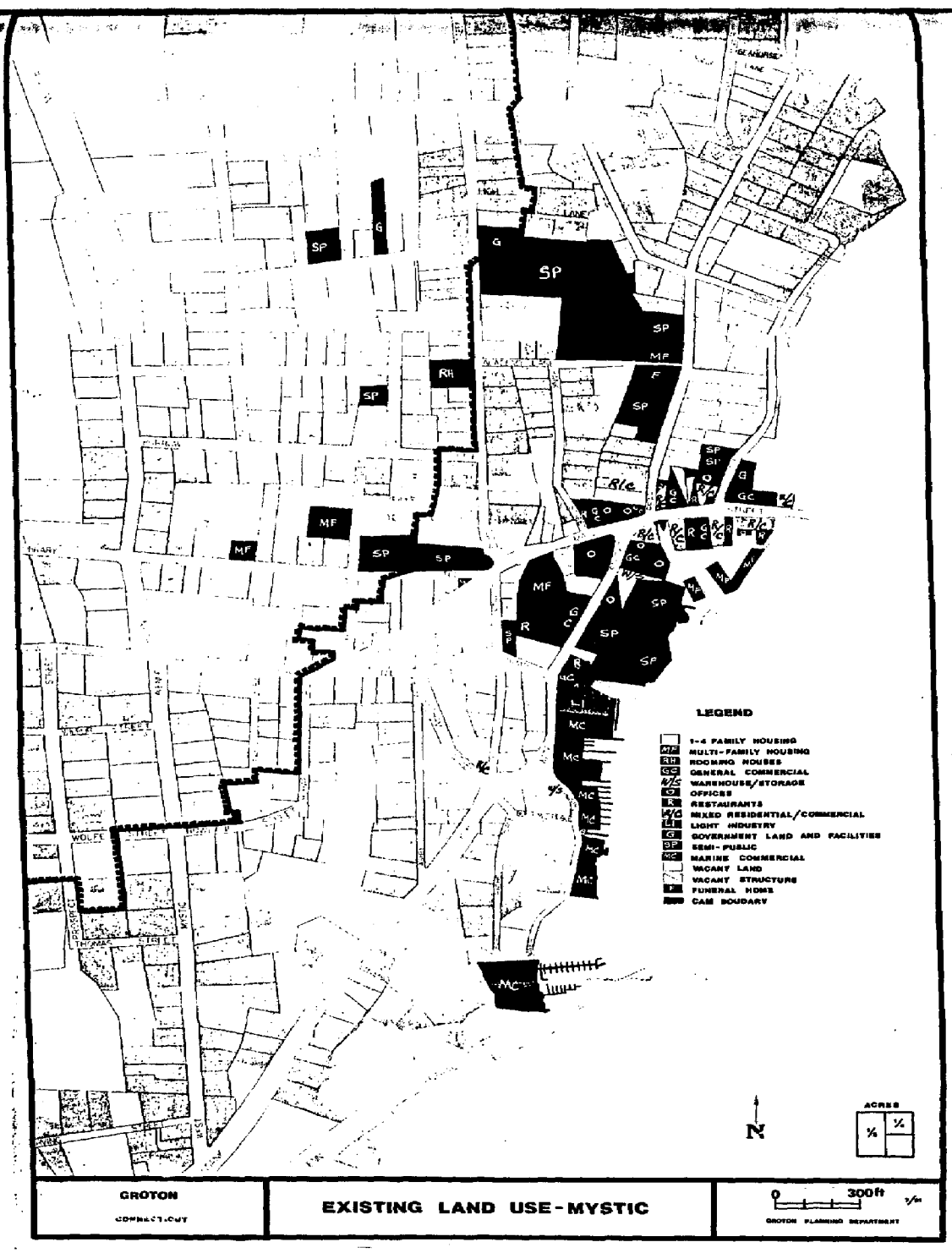
The coastal hazard area is relatively extensive north of Route 1, encompassing most of the land between the river and the hillside west of Pearl street and Grove Avenue. To the south of Route 1, the coastal hazard area becomes increasingly narrower; encompassing the shopping and marina area east of Water Street in Mystic and the marina area in Fort Rachel Place.

Most of the shorelands are physically separated from the waterfront portions of the coastal area by a sudden rise in elevation (slopes ranging from approximately 25% to as much as 90%) between Pearl and High Streets north of Route 1 and west of Water Street south of Route 1. The residential portion of Mystic straddles this hillside to the north and south of the shopping area, which lies between the foot of the hillside and the river.

The residential portion of the community is largely composed of single family homes, with a few multi-family houses, churches and a school. Most of the residential area is within the Mystic historic district, and the houses are generally well maintained and in good condition. There are a number of vacant and large lots scattered throughout the area, which at some point could potentially be developed.

The Mystic shopping area is located on Main Street (Route 1) between the Mystic River drawbridge and Bank Street and on Water Street north of New London Road. There are approximately 70 stores in the shopping area, including eight restaurants, numerous clothing, convenience and food stores, and a variety of specialty shops. Many of the commercial buildings have residential uses above them and there are two multi-family complexes in the village center area.

The present use of Mystic is illustrated on the Existing Land Use Map on the next page. The condition of buildings in Mystic as determined by exterior inspection is contained on the Exterior Conditions Map.


LEGEND
1-4 FAMILY HOUSING
MF MULTI-FAMILY HOUSING
RH ROOMING HOUSES
GC GENERAL COMMERCIAL
W/S WAREHOUSE/STORAGE
O OFFICES
R RESTAURANTS
M/C MIXED RESIDENTIAL/COMMERCIAL
LI LIGHT INDUSTRY
G GOVERNMENT LAND AND FACILITIES
SP SEMI-PUBLIC
MC MARINE COMMERCIAL
VACANT LAND
VACANT STRUCTURE
F FUNERAL HOME
CAM BOUDARY
N
ACRES
GROTON
CONNECTICUT
EXISTING LAND USE - MYSTIC
0 300ft
GROTON PLANNING DEPARTMENT

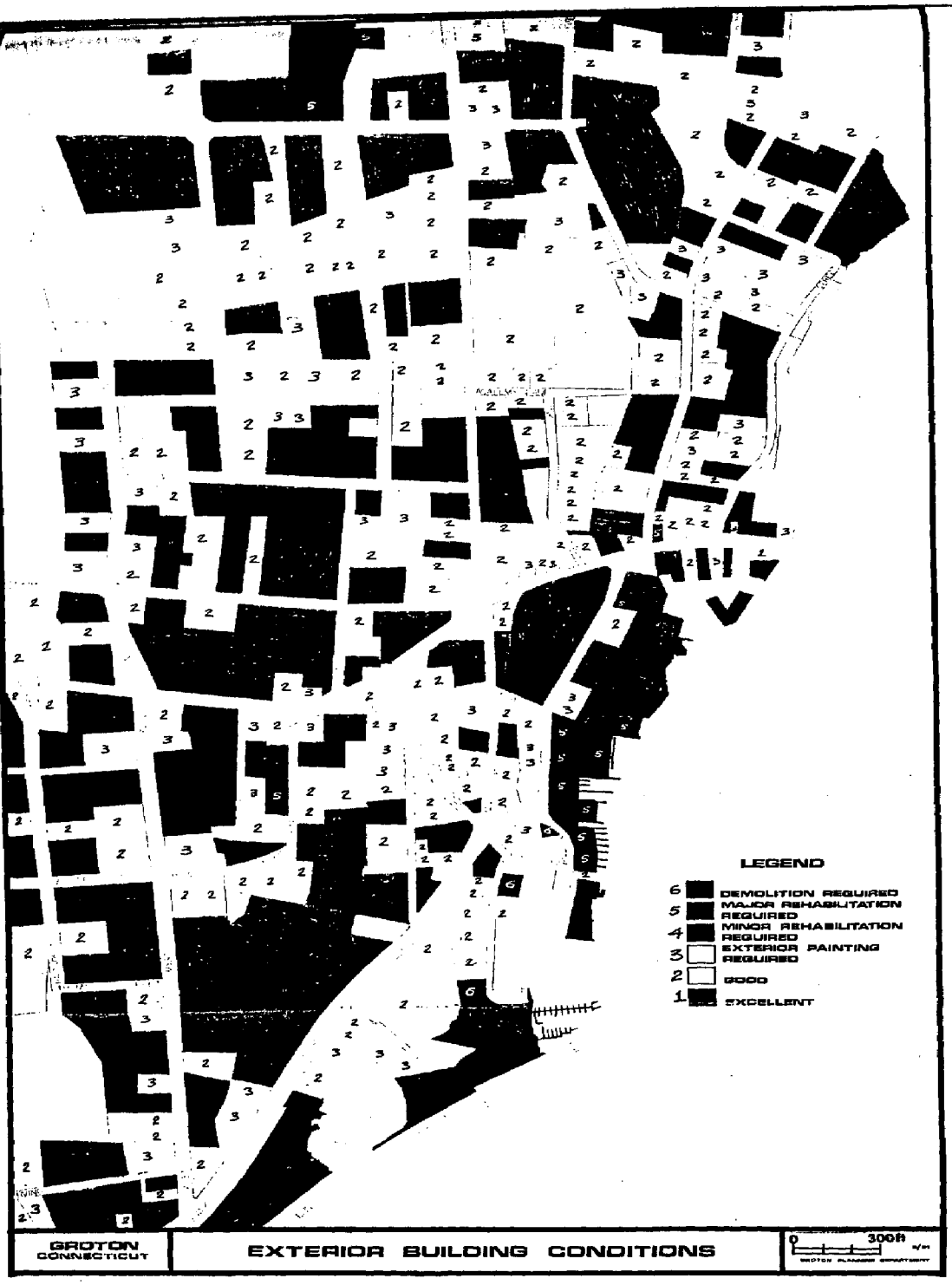

LEGEND
6 DEMOLITION REQUIRED
5 MAJOR REHABILITATION REQUIRED
4 MINOR REHABILITATION REQUIRED
3 EXTERIOR PAINTING REQUIRED
2 GOOD
1 EXCELLENT
GROTON
CONNECTICUT
EXTERIOR BUILDING CONDITIONS
0
300ft
m

Table 1

SQUARE FOOTAGE OF BUILDINGS BY CATEGORY*
Mystic/Ft. Rachel Area
July 1981

	Square Feet**
RESIDENTIAL Includes 161 structures used wholly or partially for residential purposes	378,300
COMMERCIAL Includes 26 structures devoted entirely or partially to commercial use	89,500
RESTAURANTS Includes eight establishments	29,400
OFFICES Ten establishments inclusive of banks and real estate offices	30,100
MUNICIPAL Two structures owned by the Town of Groton	12,000
SEMI-PUBLIC Three structures for community use	15,500
CHURCHES Includes three churches and two parishes	26,900
MANUFACTURING AND WAREHOUSE One establishment	14,500
MARINE Includes structures in use for both marine commercial and marine recreational purposes	15,700
STORAGE Two structures used only for storage purposes	1,600
UNFINISHED Presently includes four structures undergoing a change in use***	28,900

*Refer to Existing Land Use Map.

**Figures rounded to nearest 100.

***Unfinished structures are vacant.

Source: Town of Groton Planning Department.

Table 2

ACREAGE OF LAND USE BY CATEGORY
Mystic/Fort Rachel Area
July 1981

	Acres
Residential	50.2
Residential/Commercial (includes restaurants)	3.3
Commercial (includes banks, offices and restaurants)	3.7
Municipal Facilities	6.1
Semi-Public Uses	6.2
Cemetery	.2
Light Industry	2.2
Warehouse/Storage	5.5
Marine Facilities	2.3
Vacant (includes both private and municipal land)	2.3
Roads and Highways	13.7
Total	96.0

*Due to multi-use structures on certain parcels of land, categories are inclusive of other uses where noted.

Source: Town of Groton Planning Department.

2. Parking

Parking in the study area includes both on-street and off-street spaces, most of them controlled by time limits, parking fees, or private ownership. It is not possible to determine the exact number of spaces existing because some off-street areas are not available to the public, and because some off-street and all of the on-street spaces are not marked or physically laid out. An inventory of available parking however, identified about 300 existing spaces east of Water and Pearl Streets which can be used with some restrictions, by the public. This total includes about 60 on-street spaces. The locations of these parking spaces are shown in Figure 1.

In order to determine existing parking patterns during the peak summer period, a series of counts and surveys was made in August 1981. These counts covered both parking accumulations - the number of cars parked

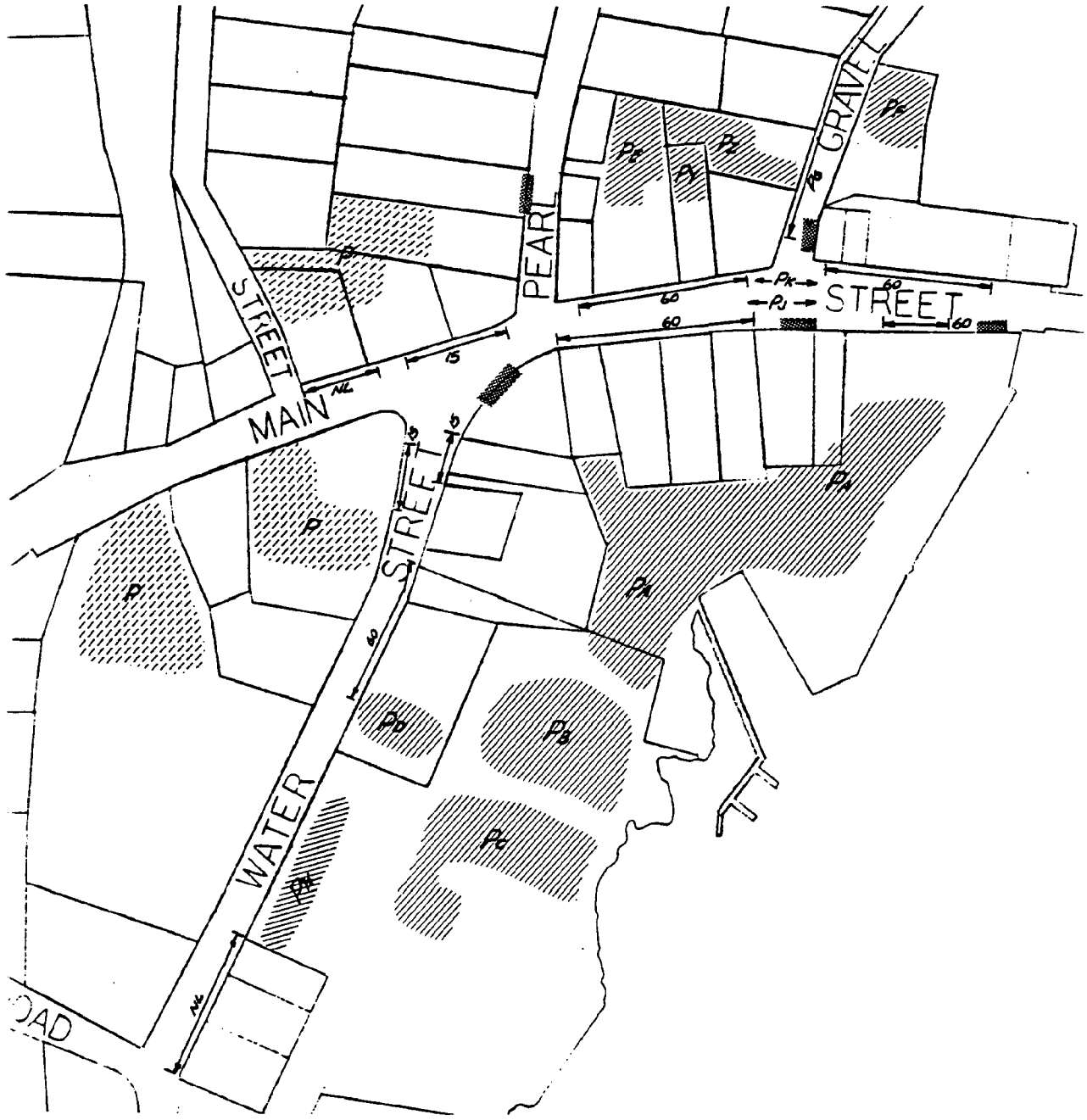


FIGURE 1

Parking Areas

and the several locations throughout the day and duration the distribution of length of time parking at selected locations. The results of these surveys are shown in Tables 3 and 4.

The results of these surveys show a heavy use of available parking space during daylight hours. The counts made at 12:00 noon, 2:30 PM, and 4:30 PM showed space occupancies ranging from 72 to 82 percent of the total space. The 10:30 AM and 5:30 PM counts ran slightly lower. When the accumulation is greater than 85 percent the area generally is perceived to be full. The main parking lot had occupancies generally over 90 percent during the higher count hours, and the on-street spaces along West Main Street also were frequently more than 90 percent occupied. Saturday parking pattern in the August surveys were reasonably similar to the weekday patterns.

The parking duration study made at the main (McGee) lot shows substantial use by both short and long-term parkers. The composite distribution for the four survey days shows that short term parkers; i.e., those observed only one time, represent 55 percent of the total number of parked vehicles, but utilized only about 25 percent of the space-hours used. Conversely, long term parkers; i.e., those observed four or five times during the day, represent less than 25 percent of the total parkers, but about 50 percent of the space-hours used. The surveys at the curbs along West Main Street showed that most vehicles are parked in compliance with the one-hour limit. Some parking of between one and two hours was recorded, but very few long term parkers were counted at the curb spaces.

3. Traffic

Traffic operations in the central area of Mystic are controlled primarily by the physical restraints. The intersection of West Main and Water Streets and the drawbridge over the Mystic River. The signalized intersection of West Main and Allyn Street/West Mystic Avenue is sufficiently distant from the central area so that it does not have a direct impact on traffic conditions.

Both West Main Street and Water Street have varying curb-to-curb widths. Essentially, they both provide one moving lane in each direction. West Main Street has parking on both sides of the street. Parking also is available at intermittent locations along the east side of Water Street and on Gravel Street.

Manual turning movement counts were made at the intersection of West Main Street and Water Street on August 26, 27, and 28, 1981. Counts were made separately for the hours of 9:15-10:15 AM, 11:30 AM - 12:30 PM, and 4:00-5:00 PM. The results of these three hourly counts for the three days, and the average counts for the three hours, are shown in Figure 2.

Table 3
Parking Accumulation

	Number of Vehicles Parked														
Parking Area	P_A	P_B	P_C	P_D	$P_{H/NL}$	P_E	P_F	P_Y	P_Z	P_J	P_K	P_G	Total Parked Vehicles Counted	Total Spaces Counted	Percent of Spaces Occupied
Total Spaces	87	29	49	12	22	16	9	6	9	19±	20±	14			
8-19-81 (W)															
10:30A	78	8	27	10(1)	20(2)	9	9	1	2	14(2)	18(2)	12	208	292	71
12:00N	84	17	41		20(2)	11	9	5	3	14(2)	19(2)	14	247	292	85
2:30P	79	17	38		18(2)	14	7	2	4	12	19	14	234	292	80
4:30P	65	8	34		20(2)	11	7	3	4	10	16	13	201	292	69
5:30P	67	5	23			4	3	5	3			6	126	231	55
8-21-81 (F)															
10:30A	79	6	31		18(3)	6	9	4	6	16	19	14	218	292	75
12:00N	82	20	43		23(3)	10	9	6	6	12	20	15	256	292	88
2:30P	81	19	41		22(3)	12	8	6	6			13	218	253	86
4:30P	74	10	36		24(3)	11	7	5	6			14	197	253	78
5:30P	78	15	49			9	7	5	6			12	191	231	83
8-22-81 (S)															
10:30A	71	9	30			8	9	5	4	17	18	10	191	270	71
12:00N	79	11	31			12	9	4	9	18	18	13	214	270	79
2:30P	74	16	39			13	8	4	6	14	18	12	214	270	79
4:30P	74	11	38			14	9	4	4	17	20	10	211	270	78
5:30P	78	11	27			11	8	2	5			10	162	231	70
8-25-81 (T)															
10:30A	78	9	33			14	8	2	5	14	17	13	203	270	75
12:00N	86	10	33			14	8	5	5	17	20	16	224	270	83
2:30P	82	22	39			11	8	4	7	17	19	11	230	270	85
4:30P	77	14	34			13	8	3	7	16	17	14	213	270	79
5:30P	71	9	32			7	7	4	5			6	151	231	65

Notes: (1) Estimated number of vehicles parked throughout surveys
(2) Counts made on 8-26-81
(3) Counts made on 8-28-81

TABLE 4A

WEDNESDAY
8/19/81

VEHICLE PARKING DURATION SUMMARY

	10:30AM	12:00N	2:30PM	4:30PM	5:30PM	VEHICLES PARKED AREA PA	AREA PB
VEHICLES FIRST PARKED AT 10:30 AM	XXXXXXXXX					18	1
	XXXXXXXXX	XXXXXXXXX				12	0
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX			13	2
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX		16	2
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	19	3
VEHICLES FIRST PARKED AT 12:00 NOON		XXXXXXXXX				18	10
		XXXXXXXXX	XXXXXXXXX			2	0
		XXXXXXXXX	XXXXXXXXX	XXXXXXXXX		0	0
		XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	4	0
VEHICLES FIRST PARKED AT 2:30 PM			XXXXXXXXX			18	8
			XXXXXXXXX	XXXXXXXXX		5	2
			XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	2	0
VEHICLES FIRST PARKED AT 4:30 PM				XXXXXXXXX		10	1
				XXXXXXXXX	XXXXXXXXX	9	0
VEHICLES FIRST PARKED AT 5:30 PM					XXXXXXXXX	33	2

TOTAL CARS PARKED	179	31
NUMBER OF SPACES	87	29
AVERAGE TURNOVER	2.06	1.07
SPACE-OBSERVATIONS	373	55
CARS PARKED:		
1 OBSERVA.	97	22
2	28	2
3	15	2
4	20	2
5	19	3
	179	31

TABLE 4B

FRIDAY
8/21/81

VEHICLE PARKING DURATION SUMMARY

	10:30AM	12:00N	2:30PM	4:30PM	5:30PM	VEHICLES PARKED AREA PA	AREA PB
VEHICLES FIRST PARKED AT 10:30 AM	XXXXXXXXX					15	1
	XXXXXXXXX	XXXXXXXXX				12	0
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX			10	1
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX		22	1
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	20	3
VEHICLES FIRST PARKED AT 12:00 NOON		XXXXXXXXX				12	12
		XXXXXXXXX	XXXXXXXXX			2	1
		XXXXXXXXX	XXXXXXXXX	XXXXXXXXX		3	0
		XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	1	3
VEHICLES FIRST PARKED AT 2:30 PM			XXXXXXXXX			14	7
			XXXXXXXXX	XXXXXXXXX		1	1
			XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	8	2
VEHICLES FIRST PARKED AT 4:30 PM				XXXXXXXXX		11	0
				XXXXXXXXX	XXXXXXXXX	8	0
VEHICLES FIRST PARKED AT 5:30 PM					XXXXXXXXX	41	7

TOTAL CARS PARKED	180	39
NUMBER OF SPACES	87	29
AVERAGE TURNOVER	2.07	1.34
SPACE-OBSERVATIONS	394	71
CARS PARKED:		
1 OBSERVA.	93	27
2	23	2
3	21	3
4	23	4
5	20	3

TABLE 4C

SATURDAY
8/22/81

VEHICLE PARKING DURATION SUMMARY

	10:30AM	12:00N	2:30PM	4:30PM	5:30PM	VEHICLES PARKED AREA PA	AREA PB
VEHICLES FIRST PARKED AT 10:30 AM	XXXXXXXXX					13	2
	XXXXXXXXX	XXXXXXXXX				11	2
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX			9	0
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX		7	1
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	31	4
VEHICLES FIRST PARKED AT 12:00 NOON		XXXXXXXXX				16	4
		XXXXXXXXX	XXXXXXXXX			0	0
		XXXXXXXXX	XXXXXXXXX	XXXXXXXXX		2	0
		XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	3	0
VEHICLES FIRST PARKED AT 2:30 PM			XXXXXXXXX			16	9
			XXXXXXXXX	XXXXXXXXX		3	1
			XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	3	1
VEHICLES FIRST PARKED AT 4:30 PM				XXXXXXXXX		15	2
				XXXXXXXXX	XXXXXXXXX	10	2
VEHICLES FIRST PARKED AT 5:30 PM					XXXXXXXXX	31	4
TOTAL CARS PARKED						170	32
NUMBER OF SPACES						87	29
AVERAGE TURNOVER						1.95	1.10
SPACE-OBSERVATIONS						376	58
CARS PARKED:							
1 OBSERVA.						91	21
2						24	5
3						14	1
4						10	1
5						31	4
						170	32

TABLE 4D

TUESDAY
8/25/81

VEHICLE PARKING DURATION SUMMARY

	10:30AM	12:00N	2:30PM	4:30PM	5:30PM	VEHICLES PARKED AREA PA	AREA PB
VEHICLES FIRST PARKED AT 10:30 AM	XXXXXXXXX					26	2
	XXXXXXXXX	XXXXXXXXX				7	2
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX			7	0
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX		25	2
	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	13	3
VEHICLES FIRST PARKED AT 12:00 NOON		XXXXXXXXX				24	3
		XXXXXXXXX	XXXXXXXXX			3	0
		XXXXXXXXX	XXXXXXXXX	XXXXXXXXX		3	0
		XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	4	0
VEHICLES FIRST PARKED AT 2:30 PM			XXXXXXXXX			19	10
			XXXXXXXXX	XXXXXXXXX		2	5
			XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	6	2
VEHICLES FIRST PARKED AT 4:30 PM				XXXXXXXXX		16	1
				XXXXXXXXX	XXXXXXXXX	8	1
VEHICLES FIRST PARKED AT 5:30 PM					XXXXXXXXX	40	3
TOTAL CARS PARKED						203	34
NUMBER OF SPACES						87	29
AVERAGE TURNOVER						2.33	1.17
SPACE-OBSERVATIONS						394	64
CARS PARKED:							
1 OBSERVA.						125	19
2						20	8
3						16	2
4						29	2
5						13	3
						203	34

These traffic volumes by themselves are not especially heavy, and the intersection and the streets have sufficient capacity to accommodate them. Traffic operations, however, are adversely affected by the following existing conditions.

1. The drawbridge over the Mystic River is raised for several minutes each hour to permit passage of boats. This creates delays and long queues of waiting vehicles which, under heavy traffic conditions, can take much of the following hour to clear out.

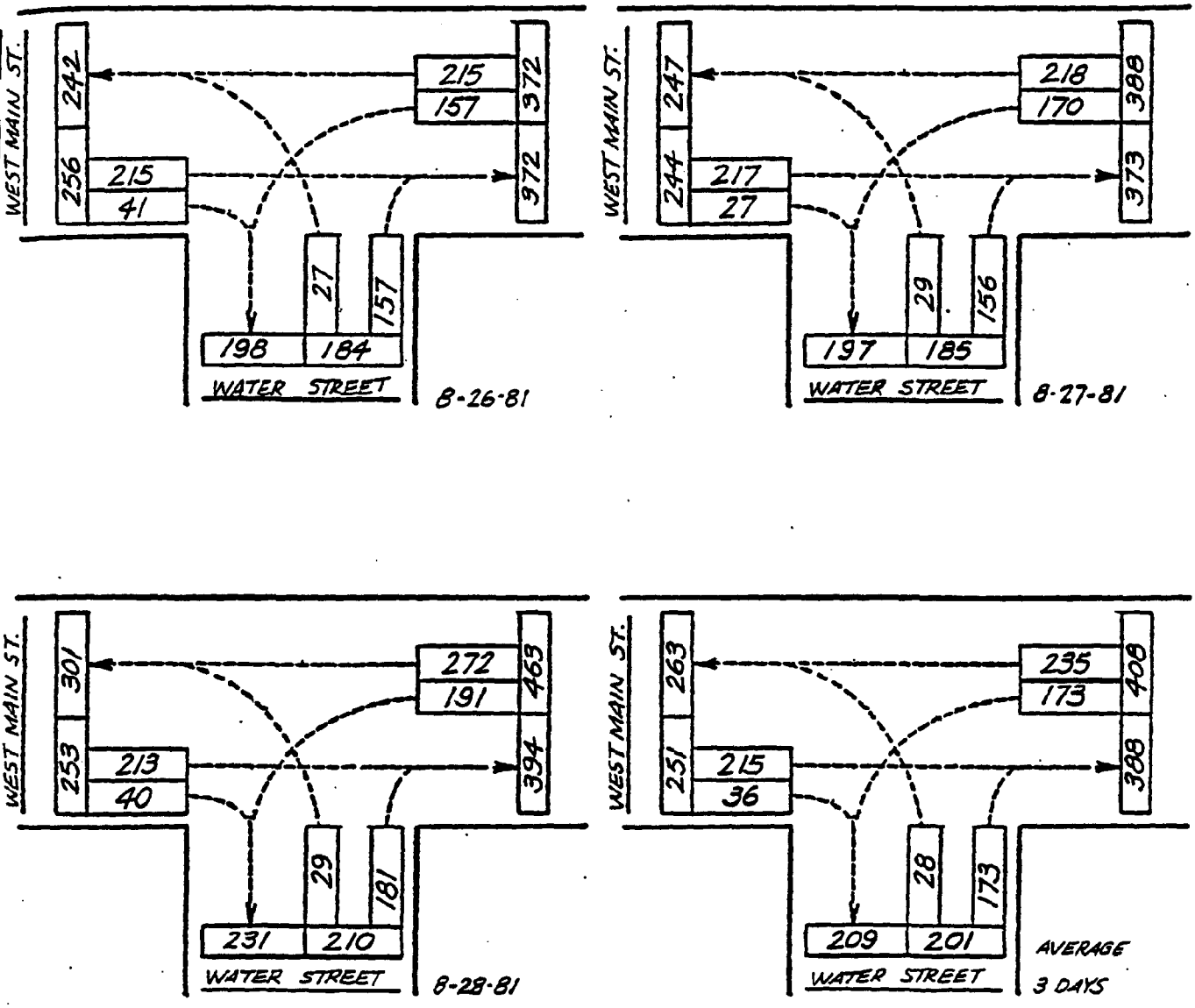
2. Parking maneuvers and searching for parking on West Main Street cause delays to traffic by requiring through traffic to stop behind each such maneuver. The single moving lane in each direction does not permit bypassing park-maneuvering vehicle. This situation also exists on Water Street, although to a much lesser extent.

3. The single lane approaches at the intersection of West Main and Water Streets do not provide separate storage areas for left turning vehicles. As a result, the westbound to southbound and northbound to westbound left turn movements subject vehicles behind the turning vehicles to some delay.

4. Uncontrolled and random pedestrian movements conflict with and tend to slow down the traffic flow. The result of these conditions is a degree of congestion and delay, and a perception of conditions being worse than they really are.

In order to determine the travel speeds and delays in the central area, a series of time runs was made on West Main Street between Allyn Street and the east end of the Main Street bridge. These runs were made in the period August 19-22, 1981 at various times of the day, using a car and a stopwatch to record the travel time, and delays. The results of these time runs are shown in Table 5.

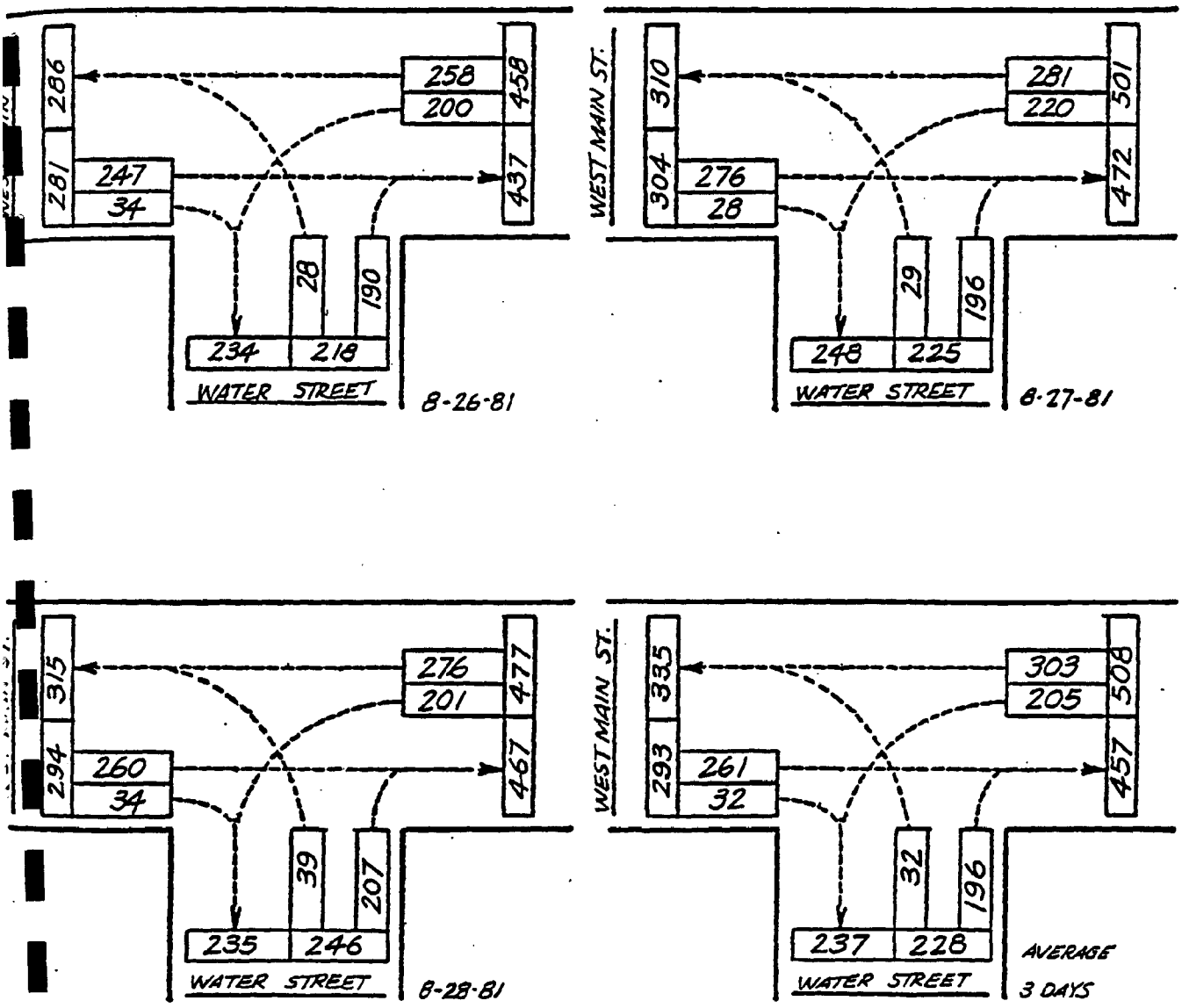
The results of these runs show that the moving travel times for this section varied from just under two minutes to just under three minutes; with average speeds of between 14 and 21 miles per hour. However, the stop or delay times varied greatly, from a low of 10 seconds to a high of 302 and 427 seconds for runs when the bridge was up. Overall average speeds for the runs, including stop time, varied from 9 to 18 miles per hour, except for the runs with the bridge openings when they were reduced to 6 and 4 miles per hour.



9:15 - 10:15 AM

Figure 2-A

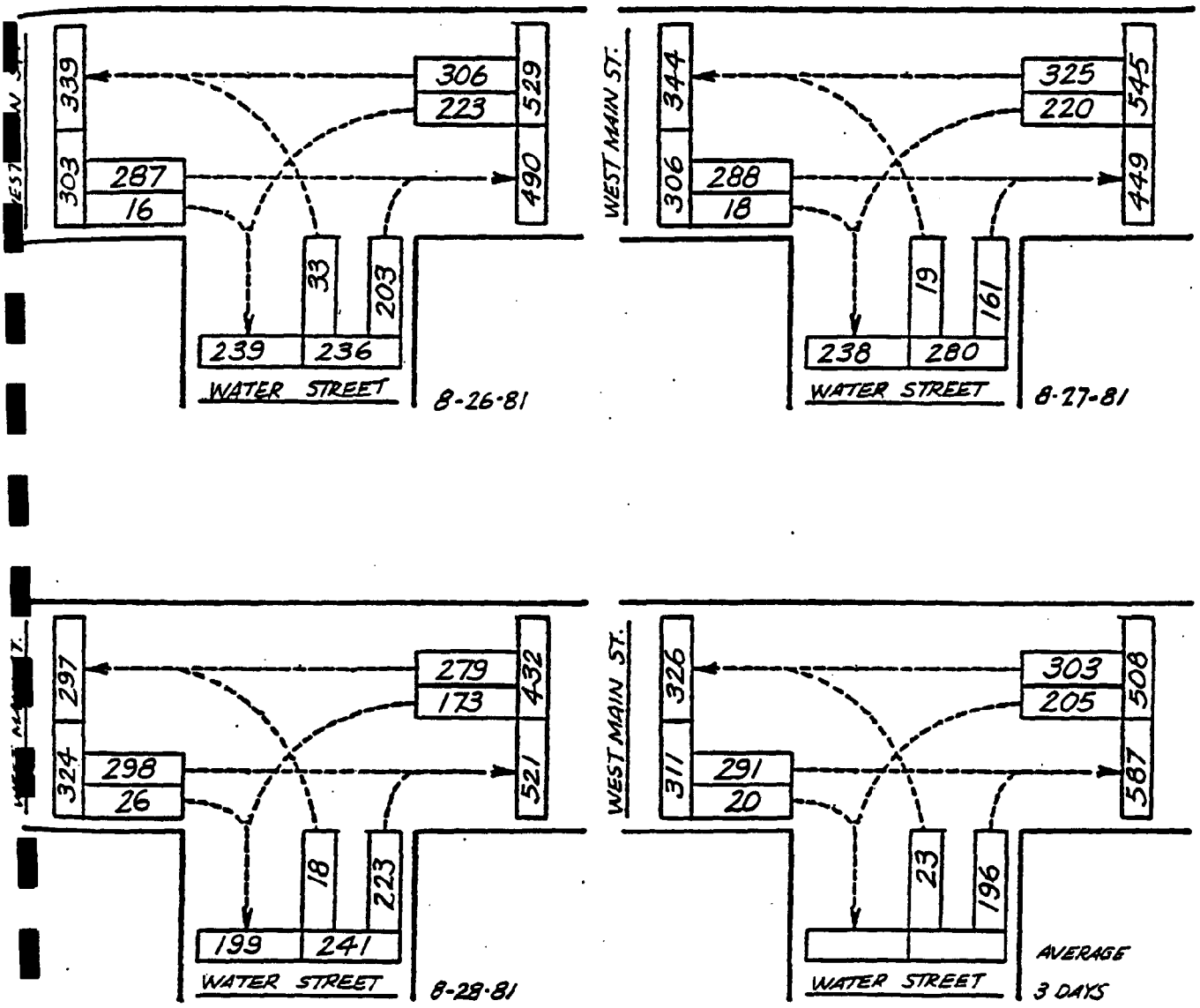
Manual Turning Movement Counts



11:30 AM-12:30 PM

Figure 2-B

Manual Turning Movement Counts



4:00 - 5:00 PM

Figure 2-C

Manual Turning Movement Counts

The low travel speeds, even without considering the stop times, reflect the congested conditions on West Main Street during these peak times.

Table 5

Speed and Delay Survey Results of Test Runs

	Time in Seconds				
Eastbound	Travel Time	Stop Time	Total Time	Moving Speed	Net Speed
8-19 1:30 PM	125	10	135	19	18
8-21 12:15	139	427	566	17	4
8-21 10:00	112	17	129	21	18
8-22 12:47	126	83	209	19	11
8-22 4:30	123	150	273	19	9
Westbound					
8-21 1:30 PM	114	302	416	21	6
8-21 12:35	119	53	172	20	14
8-21 10:00 AM	131	36	177	18	13
8-22 1:00 PM	132	48	180	18	13
8-22 4:30 PM	174	43	217	14	11

Distance = say 3500 ft.

4. Plan of Development

The current Plan of Development designations in the Mystic-Fort Rachel area include high density residential (approximately 7,500 square feet per unit), moderate density residential (approximately 12,000 square feet per unit), waterfront design district and public facilities.

Most of the community is classified as moderate density residential. Existing uses in this area are generally consistent with the plan, although many of the existing lots exceed 12,000 square feet in size. A relatively small area in the Orchard Lane/High Street vicinity south of Route 1 and Bank Street/Pearl Street vicinity north of Route 1 is classified as high density residential in the plan. Existing uses in this area include one and two family houses and a few scattered semi-public uses. The waterfront design district encompasses the shopping area south of Main Street (Route 1), the waterfront marina area east of Water Street and most of the Fort Rachel Park area. Existing uses in this area encompass a mixture of commercial, residential, semi-public and marine commercial uses.

The main conflict between the plan of development and existing uses is that the commercial uses on the north side of Main Street are classified as moderate and high density residential, rather than waterfront design. In addition, although the concept is valid, "waterfront design district" may not be an appropriate classification, since it is a zoning designation. Thus, it may be appropriate to reclassify the area, while retaining the existing purposes and definitions.

5. Current Zoning

The existing zoning in the Mystic-Fort Rachel area is generally consistent with the Plan of Development. Residential districts include RS-8 (single family; minimum lot size of 8,000 square feet), RS-12 (single family; minimum lot size of 12,000 square feet) and a small area at the outskirts of the village zoned RS-20 (minimum lot size 20,000 square feet). The residential district boundaries are largely the same as the plan of development areas, and potential conflicts include the over-size lots in the RS-12 zone and scattered two-six family residences in both the RS-8 and RS-12 zones.

The Waterfront Design District (WDD) includes a slightly larger area than included in the Plan of Development; in that the commercial frontage north of Main Street and the marine commercial area between the railroad tracks and Fort Rachel Place/Water Street are within the district. Thus, the conflict between the existing uses and the Plan of Development does not occur in terms of present zoning patterns.

C. ISSUES AND PROBLEMS

An identification of the issues and problems confronting Mystic and Fort Rachel forms a basic component of the study, since proposals and recommendations will be based upon the identified issues. These issues are summarized on the Issues Map which follows this page. A number of issues pertaining to Mystic and Fort Rachel were previously identified in Chapter V of the CAM Report. These are incorporated here, with other issues identified during an analysis of existing factors (land use patterns, zoning, building conditions, physical characteristics, traffic and parking and at public meetings. A Planning Factors Map is attached to identify these conditions. A basic premise of this analysis is that development pressures will continue to intensify over the decade. The issues are as follows:

1. Permitting more intensive development vs. maintaining Mystic's existing character:

As development pressures intensify, the existing character of the village will be under increasing pressure to change. Policies concerning the future role and size of the business area, the future of existing residential areas, the use of and access to the waterfront, etc., need to be adopted at this time in order to guide future development.

2. Potential expansion of the business area:

There is a question of how much, if any, expansion of the commercial area is desirable, in terms of the impact on the nearby residential neighborhoods, retention of the shopping area's existing character and the ability to provide access and parking to accommodate an expansion of the shopping area. The physical expansion of the business area in the Groton portion of Mystic is limited on the east by the Mystic River and to a large extent on the west by the steep hillsides above Water and Pearl Streets. Thus, the pressure for expansion will probably be to the north and south of the existing shopping area. To the south, the area is zoned waterfront design (permitting the use of shops as well as residences) and currently exhibits a mixture of residences, boat yards, and marinas. However, north of the commercial area, along Gravel and Pearl Streets, the zoning and uses are essentially residential. In addition, existing access and parking problems indicate that changes in the street system and the creation of additional parking would be necessary to accommodate a significant expansion of the commercial area. (This would be difficult to achieve because of the built-up nature and lack of vacant land close to the shopping area.)

3. Preservation of residential neighborhoods:

As previously mentioned, potential commercial expansion will continue to pressure surrounding residential areas, particularly to the north of the shopping area along Gravel and Pearl Streets. There is a need to weigh the demand and potential for commercial expansion with the desire to preserve the nearby residential neighborhoods.

4. Future of Ft. Rachel Place:

Much of the Fort Rachel Place area is largely vacant and underutilized, offering an opportunity for water-related uses (see Planning Considerations Map). Because of topography (see Topography Map), development may be difficult in places, although portions of the area may be well suited for recreation and open space. Several alternate development schemes for Fort Rachel Place were developed to explore possible development patterns in the area. These schemes are included with this section.

5. Traffic congestion:

Access to and through the shopping area is restricted by the relatively narrow streets and the lack of alternative routes. Congestion is a problem, particularly in the summer, because of the large number of people visiting the area. This situation is compounded during the summer months by the Route 1 drawbridge, which is closed for five to fifteen minutes out of every hour.

6. Parking problems:

During the summer months, there is a lack of parking for visitors and shoppers in the Mystic commercial area. This can result in motorists using the nearby residential streets for parking or can discourage visitors from stopping. The problem is exacerbated by the lack of suitable nearby areas for parking lot expansion.

7. Waterfront access:

The shorefront north of the Route 1 drawbridge is lined with historic houses facing quiet lawns which cross Gravel Street and descend to the river. This area (in private ownership) provides the only significant visual access to the river in the village, and there is a need to preserve it as open space. South of Route 1, existing development, including multi-family housing (condominiums), commercial uses and parking areas, has blocked the view of and physical access to the river. Thus there is a need to preserve existing vistas and explore potential access points in conjunction with future development.

8. Future use of large lots and vacant areas:

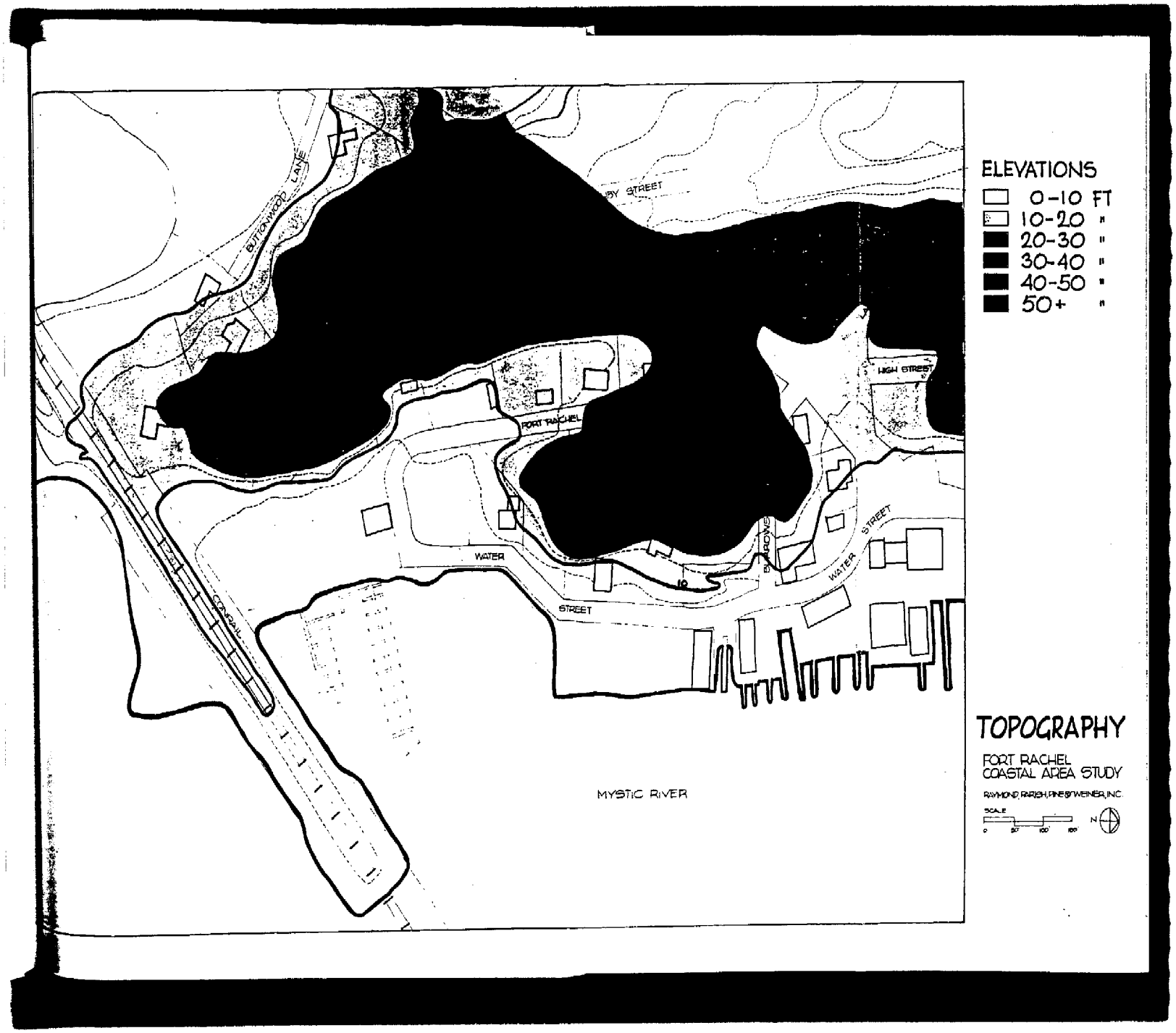
There are a number of oversize lots (according to the zoning requirements) in the Mystic area, which potentially could be subdivided and developed. Concentrations of large and/or vacant lots occur in the vicinities of Mystic Avenue and Noank Road, West Main and Burrows Streets, the Allyn Street connector, Cliff Street and Cliff Lane. The future use of these lots needs to be evaluated in terms of the uses permitted under present zoning, the desirability of this type of development, and the maintenance of Mystic's historic character.

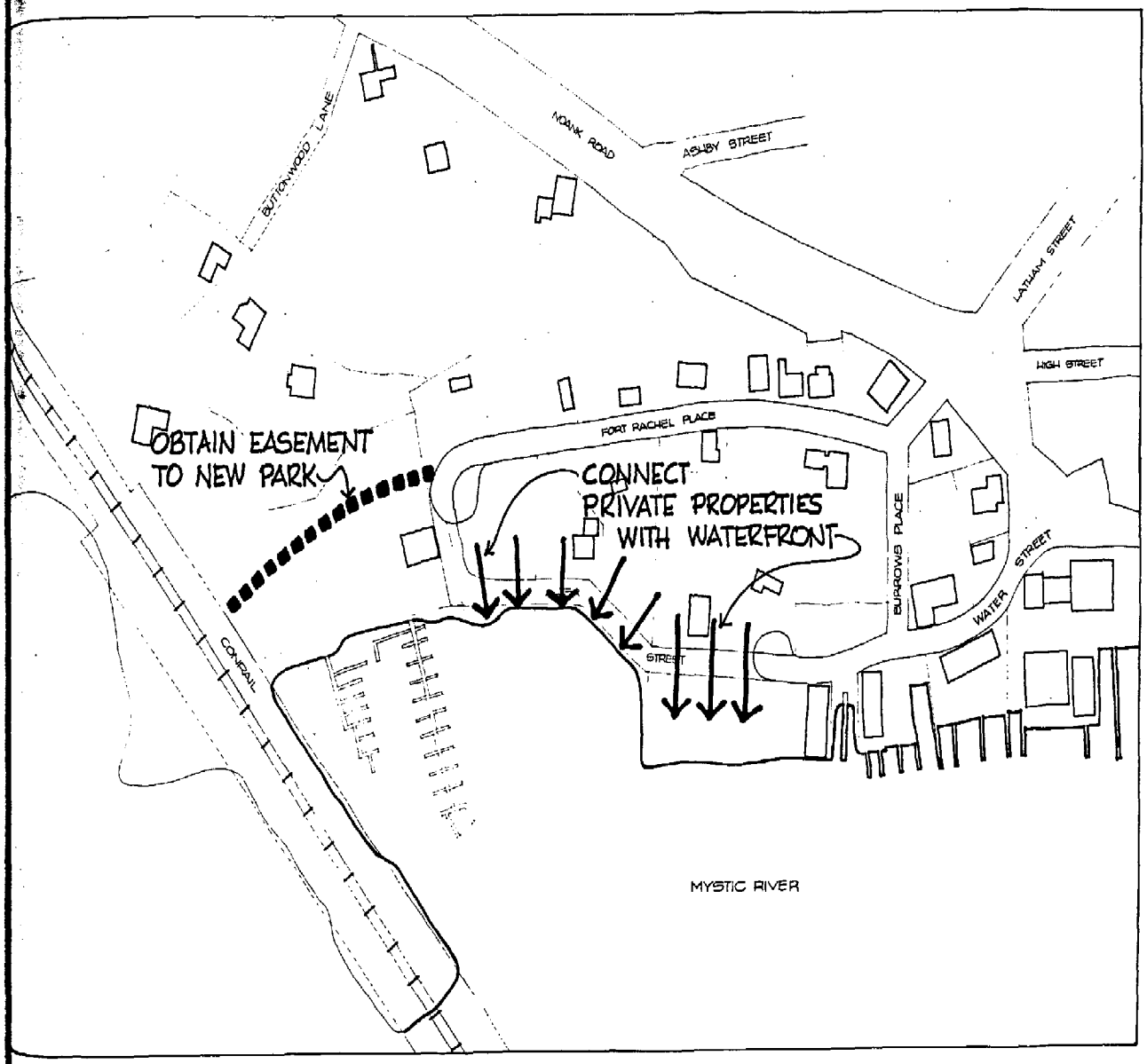
9. Vacant land created by new railroad alignment:

The new Mystic River railroad bridge alignment will create a spur of riverfront land near Fort Rachel Place. This area offers excellent waterfront recreation and access potential; however, it is currently owned by the railroad and lacks direct access from public property.

10. The feasibility of a mass transit link between commercial area and lodgings and Seaport for tourists:

The present traffic and parking problems during summer months could potentially be eased by a bus route serving the Seaport, motel area and downtown. This could, in addition to easing traffic congestion, be beneficial to the commercial area by bringing more shoppers to the area.


ELEVATIONS
0-10 FT
10-20 "
20-30 "
30-40 "
40-50 "
50+ "
BUTTONWOOD LANE
STREET
FORT RACHEL
HIGH STREET
WATER
STREET
BARROWS
WATER
STREET
CONRAIL
MYSTIC RIVER
TOPOGRAPHY
FORT RACHEL
COASTAL AREA STUDY
RAYMOND, PARISH, PINE & WEINER, INC.
SCALE
0
50'
100'
200'
N

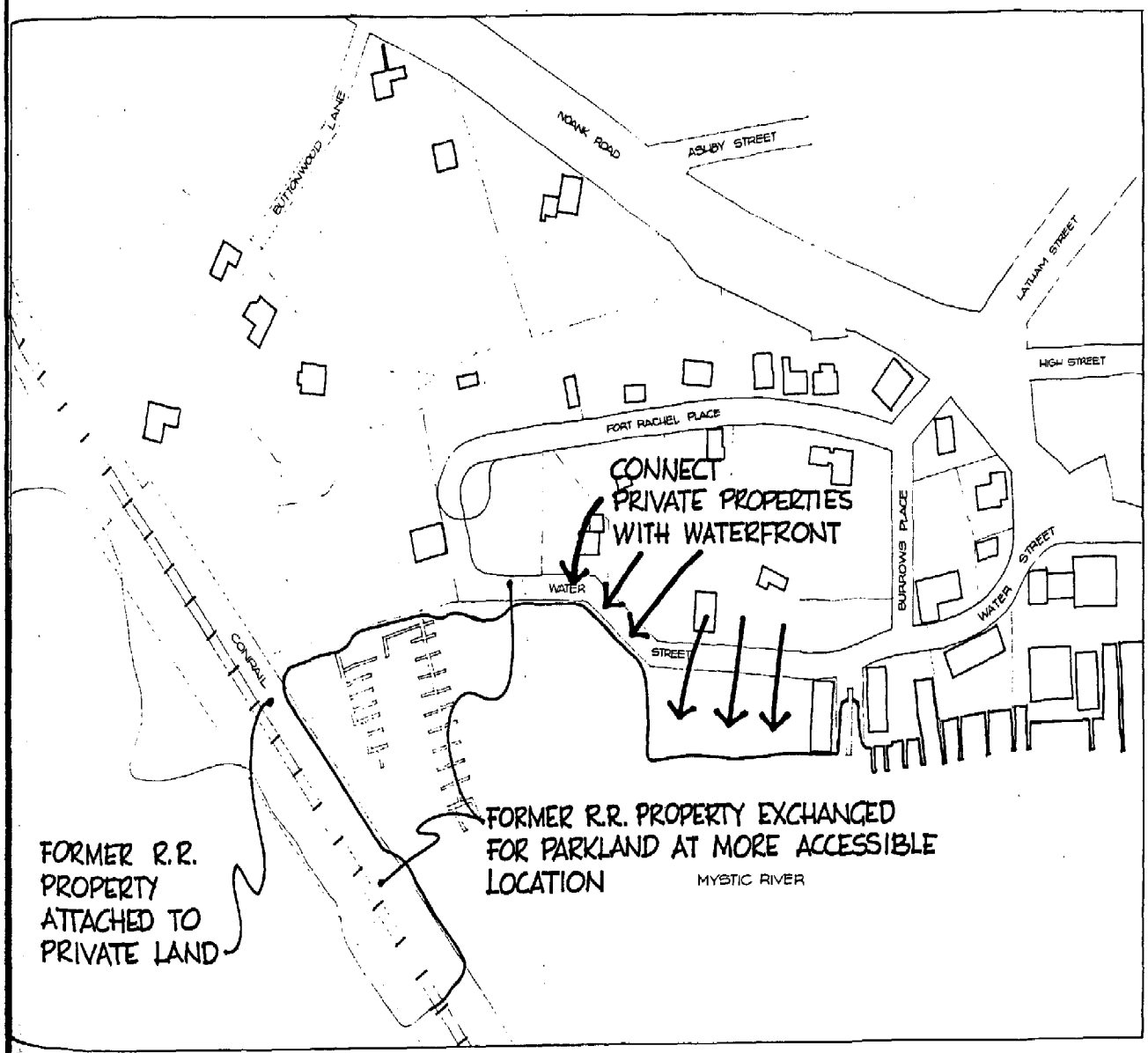


DEVELOPMENT ALTERNATE A

FORT RACHEL
COASTAL AREA STUDY

RAYMOND, PARISH, PINE & WEINER, INC

SCALE:
0 30' 60' 120'
N

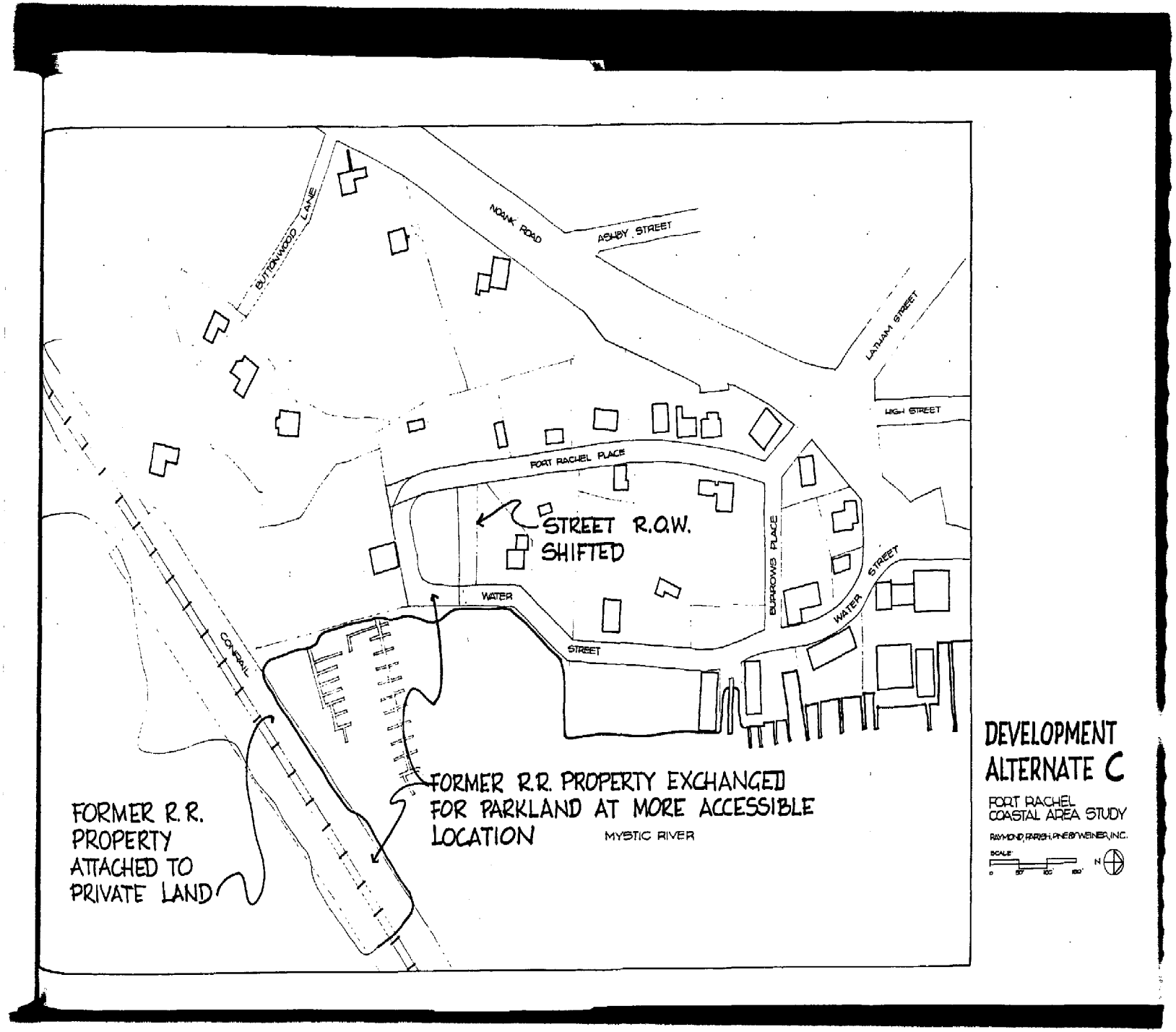


DEVELOPMENT ALTERNATE B

FORT RACHEL
COASTAL AREA STUDY

RAYMOND, PARISH, PINE & WEINER, INC.

SCALE:


BUTTERWOOD LANE
NOANK ROAD
ASHBY STREET
LATHAM STREET
HIGH STREET
FORT RACHEL PLACE
STREET R.O.W. SHIFTED
BURROWS PLACE
WATER STREET
WATER STREET
CONRAIL
FORMER R.R. PROPERTY ATTACHED TO PRIVATE LAND
FORMER R.R. PROPERTY EXCHANGED FOR PARKLAND AT MORE ACCESSIBLE LOCATION
MYSTIC RIVER
DEVELOPMENT ALTERNATE C
FORT RACHEL COASTAL AREA STUDY
RAYMOND, PARISH, PINE & WEINER, INC.
SCALE
0
50'
100'
200'
N

11. Marina development:

Expansion of boating facilities, marinas and boat yards north of the Route 1 drawbridge would alter the natural shoreline in this portion of the river. Further, the Mystic River has a limited capacity to accommodate marinas. The amount of shoreland north of the Route 1 drawbridge is very limited. The public street is close to or adjacent to the river's edge leaving little land available for development. This relationship of street to water however produces excellent views of the river and seaport which are now available to the general public. Waterside development would at least partially eliminate these views. The adjoining areas have been developed residentially for many years and are included in an historic district. The narrow street system and existing development pattern is incompatible with the introduction of marine development in this area. Another important consideration is water access. The navigation channel is located on the Stonington side of the river. Extensive dredging would be required to open the Groton shore to marina development which would be incompatible with the sensitivity of the resource.

12. Sunken barges:

Partially sunken or sunken barges near the water's edge in Fort Rachel create a blighting influence on the area.

13. Traffic and parking problems in Fort Rachel:

The combination of narrow streets and numerous marinas and docks without adequate on-site parking creates traffic congestion and parking problems in Ft. Rachel, particularly during the summer months. Access for emergency vehicles is severely hampered and residents complain of cars parked in their front yards.

14. Need to insure high quality of building and development:

Future development in Mystic that emphasizes high quality, in terms of site layout, design and construction needs to be encouraged if the existing character, remaining waterfront views and historic quality of the area are to be maintained. This is of particular concern in the waterfront design district, which encompasses the shopping area, the marinas and Ft. Rachel Place.

15. Preservation of historic character:

Preservation of the historic character of Mystic is essential to the economic health of the area, as well as being desirable from an aesthetic viewpoint.

D. POLICIES AND OBJECTIVES

The following policies and objectives apply specifically to Mystic and Fort Rachel, and are intended to complement the more general state of Connecti-

cut and Town of Groton Coastal Area Management policies. The policies and objectives for the Mystic-Ft. Rachel area incorporate (or adapt) a number of objectives from previous studies and plans (including the Town Zoning Ordinance and "A Plan for Mystic"*) which remain pertinent, in addition to those resulting from the identification of issues and problems.

The River's Edge

1. The Mystic River's natural shoreline north of the Route 1 drawbridge should be preserved. Future construction of docks, piers, bulkheads or other structures should be limited to only those improvements which are necessary to maintain or improve the existing shoreline.

2. Marina and boat yard development or expansion should be limited to the riverfront south of the Route 1 drawbridge and should be controlled by the ability to provide sufficient parking and other support services on shore.

3. Future construction on the waterfront should be prohibited from obstructing public views of the water, particularly north of Route 1 along Gravel Street, where unspoiled vistas currently exist.

4. The creation of coordinated walkway system along the riverfront, enabling public views of the water, should be encouraged.

Commercial

1. Downtown Mystic should be maintained as a viable commercial, residential, and cultural area which serves the needs of the residents of Mystic and the surrounding communities.

2. In recognition of the attraction Mystic holds for tourists, a limited degree of high quality commercial development should be provided to accommodate this tourist market; however, this should be secondary to the primary role of providing services to area residents.

3. High intensity and bulk uses should not encroach into the surrounding residential neighborhood.

4. A coordinated pattern of land uses which allows safe access and movement of pedestrians, bicycles, and vehicles through the commercial area should be encouraged.

5. Structural rehabilitation, wherever feasible, should be encouraged in order to preserve and enhance the historic and diverse qualities of the Mystic area.

6. Architectural and site design which promote aesthetic qualities while sustaining and enhancing the unique and historic qualities of the Mystic area should be encouraged.

*Mystic River Task Group, "A Plan for Mystic", January, 1977.

7. Landscaping along Main and Water Streets should be encouraged to enhance the attractiveness of the shopping area.

8. Special consideration should be given to the area of water and land interface, to encourage the preservation and creation of water views, public access points and the preservation of the existing river bed.

Residential

1. New commercial/office activity should be prohibited from encroaching into Mystic's residential neighborhoods.

2. Clustering and setbacks for new residential development on the waterfront should be encouraged to protect river views.

3. Standards for new residential construction that encourage the retention of Mystic's historic quality and existing character should be established.

4. Tourist-oriented traffic should be routed away from Mystic's residential neighborhoods.

Open Space and Recreation

1. Pursue the creation of public parks and waterfront access areas to serve the residents of Mystic.

2. Pursue the creation of "mini-parks" in the downtown shopping area to serve as attractive rest areas for residents and tourists.

Circulation and Transportation

1. Improve access to the downtown Mystic area by encouraging increased public transportation to the area.

2. Explore potential methods of alleviating existing parking and traffic congestion occurring during the summer months.

3. Encourage a circulation pattern and the provision of related facilities (such as sidewalks, benches, and bike racks) which give priority to pedestrian movement and bicycle travel in the downtown area.

4. Consideration should be given to establishing parking areas for tourists adjacent to Interstate 95. In addition, the establishment of a mini-bus system should be considered to shuttle people between outlying parking areas and the Seaport, Mystic Aquarium and downtown.

E. RECOMMENDATIONS

General

The recommendations contained in this section are summarized on the Recommendations Map which follows this page.

1. The Town should pursue the acquisition and eventual development as a park of the present Mystic River Bridge Railroad embankment, which will become vacant when the proposed bridge realignment is accomplished. This proposed waterfront park would provide Mystic residents with riverfront access for fishing and passive recreation. As part of the park development, traffic access to the area might be limited to pedestrians, bicycle and emergency vehicle access.

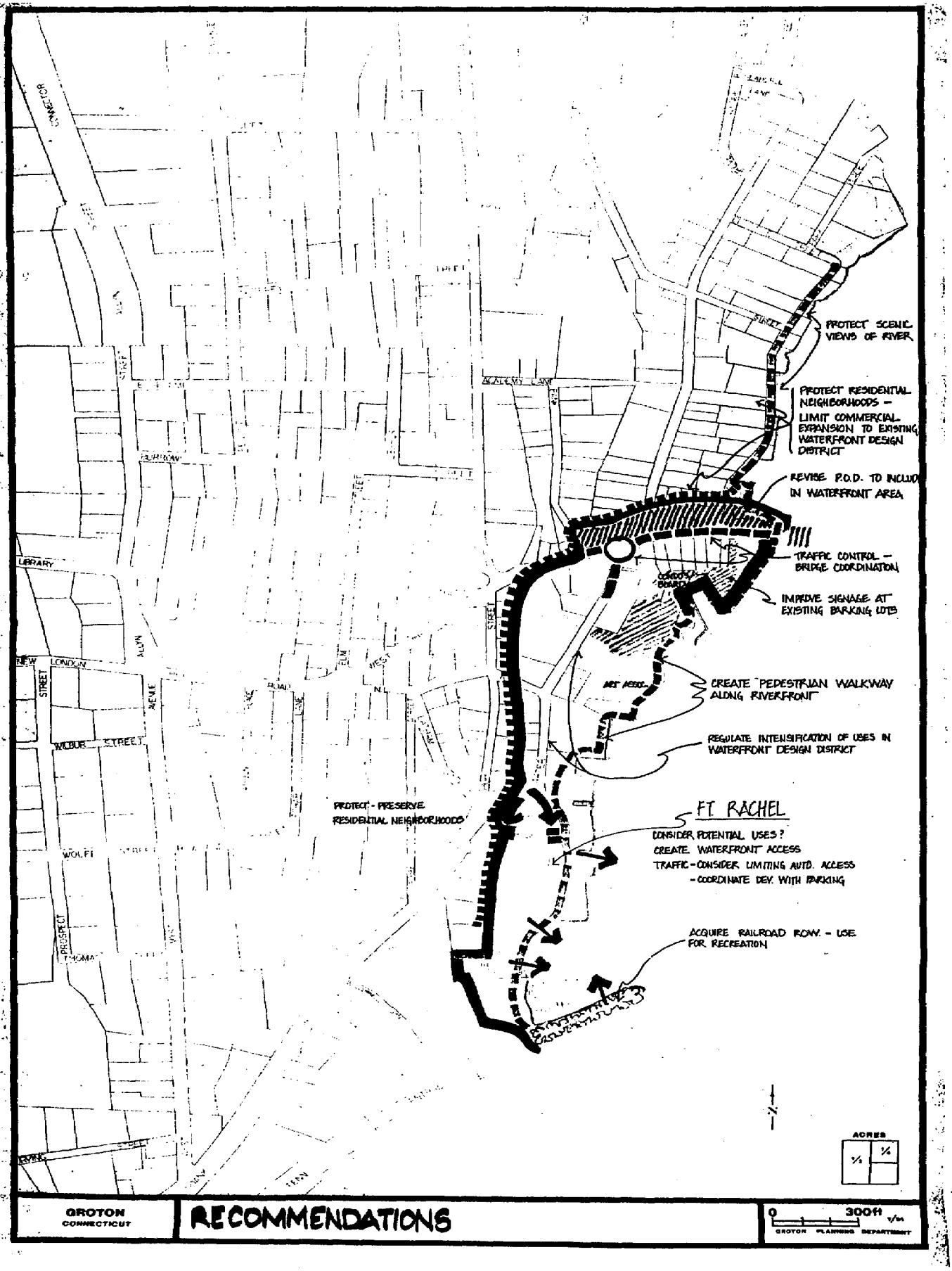
2. A pedestrian walkway along the river from the railroad embankment to Main Street should be created. This walkway should include a combination of boardwalks, existing streets (particularly if automobile access were partially limited) and gravel or blacktop walkways. In this way, the existing boardwalk at steamboat wharf, the walkway at the art Association and portions of Water Street could provide the base for the system.

Traffic and Parking

Given the existing conditions in the central area, and the expressed desire of the Town not to change the character of the area, the option for making significant improvements in traffic operations and parking are severely limited. Widening of the streets, or the construction of a by-pass street, are neither feasible nor desirable. Replacement of the existing moveable bridge with a high level fixed bridge likeways is not feasible because of the problems in con structing approach ramps. Eliminating the on-street parking on West Main Street would increase the capacity of the street, but, with the identified parking inventory shortage, these spaces would have to be replaced. Furthermore, the two-lane section of the Mystic River bridge would remain an capacity restraint.

There are, however, several measures which can be taken to improve traffic operations and parking conditions in the central area. These measures include the following:

1. Eliminate the parking spaces on the westbound approach to Water Street. These spaces - perhaps four of them - are located on the north side of Main Street between Pearl Street and Water Street. They have 15 minute parking limits. Elimination of these spaces would permit a separate left turn lane so that the westbound through traffic could continue without being blocked by left turn vehicles. It also would make it easier for large trucks to turn in the intersection. Finally, these spaces are actually within the intersection, which is not in conformance with most standards, and may even violate state regulations.


PROTECT SCENIC VIEWS OF RIVER
PROTECT RESIDENTIAL NEIGHBORHOODS –
LIMIT COMMERCIAL EXPANSION TO EXISTING WATERFRONT DESIGN DISTRICT
REVISE P.O.D. TO INCLUDE IN WATERFRONT AREA
TRAFFIC CONTROL – BRIDGE COORDINATION
IMPROVE SIGNAGE AT EXISTING PARKING LOTS
CREATE PEDESTRIAN WALKWAY ALONG RIVERFRONT
REGULATE INTENSIFICATION OF USES IN WATERFRONT DESIGN DISTRICT
PROTECT - PRESERVE RESIDENTIAL NEIGHBORHOODS
FT RACHEL
CONSIDER POTENTIAL USES?
CREATE WATERFRONT ACCESS
TRAFFIC - CONSIDER LIMITING AUTO. ACCESS
- COORDINATE DEV. WITH PARKING
ACQUIRE RAILROAD ROW. - USE FOR RECREATION
ACRES
GROTON
CONNECTICUT
RECOMMENDATIONS
0 300ft
GROTON PLANNING DEPARTMENT

2. Eliminate the parking on the northbound approach to West Main Street. There is a single parking space on the east side of Water Street near Main Street. The adjacent spaces are continuous curb cuts. Elimination of this one spot will provide about 100 feet of cleared curb which will permit two lanes approaching the intersection. Right turn vehicles will not have to wait for left turn vehicles to clear the intersection.

3. Install parking directional signs. The major public parking facility is in the block east of Water Street and south of West Main Street. There are entrances to this parking area from both streets, but directional signing is virtually non-existent. Visitors to the area must have a difficult time identifying and finding the parking areas, and eastbound vehicles are likely to be across the river and into Stonington before the driver can react. The signs should be the standard green and white "P-arrow" signs (D4, as specified in the Manual of Uniform Traffic Control Devices), and should be installed not only at the entrances but also for blocks in advance to give adequate notice to the drivers.

4. The parking areas could be rearranged for better utilization. The choice spots immediately behind the stores should be reserved for short-term parkers, while the all day and permit parking space should be located further to the south. More parking spaces can be provided in this latter area.

5. If the left turn lanes are installed (see items 1. and 2. above) at the intersection of West Main and Water Streets, a system should be set up to keep the inter section clear so that vehicles not headed towards the bridge can get through the intersection to continue their trips.

6. The Town should consider restricting automobile access to Fort Rachel to residents, people with business there (e.g. those using the marinas), emergency vehicles, etc. This might be in large part accomplished through the use of strategically located signs.

7. The Town should make Water Street and Fort Rachel Place a one-way loop. This would lessen the existing congestion and improve access for emergency vehicles.

Revisions to the Plan of Development

1. Expand the area currently designated waterfront design district to include the commercial frontage north of Main Street, the existing marina south of Fort Rachel Place/Water Street, and the railroad embankment. In the first two instances, this will make the Plan of Development consistent with present zoning and existing land use patterns.

Revisions to the Zoning Regulations

The following revisions are suggested to the Waterfront Design District (WDD) section of the Zoning Regulations for Sections 6.32 Design Objectives, 6.33 Permitted Uses and 6.34 Building and Development Standards in the WDD. Sections underlined are new proposed language. Sections in brackets ( ) are proposed for deletion.

Waterfront Design District (WDD)

6.32 Design Objectives

6.32(i) The Mystic River is the most vital element within the Waterfront Design District and as such must be given primary consideration in any proposed development. To this end, special consideration must be given to the area of the water and land interface; the preservation and creation of views from public and other areas to the water, and the preservation and integrity of the existing river bank. Pedestrian access to the river's edge should be encouraged from Main Street south to the railroad bridge.

6.33 Permitted Uses

Any residential, office, or commercial use, or mix of same, which is consistent with the purpose and objectives of the Waterfront Design District and which is not detrimental to the unique character of the area is permitted in the Waterfront Design District. Any use to be located in a new structure or any use located in an existing structure that is either an intensification of the use of that structure or will alter the exterior of the structure shall be subject to approval of a Special Permit. Intensification of use shall be defined as additional residential units, additional employment, additional clients or customers, additional floor space for sales or services or additional required parking than existed prior to the application for a Special Permit.

In granting or denying approval for a special proposed use or mix of uses, the Zoning Commission shall evaluate the proposal's conformance with the purpose and objectives as stated in Sections 6.31 and 6.32, and determine that the proposal will not be detrimental to the use or value of adjacent properties.

6.34 Building and Development Standards

(a) The maximum height of any structure within the Design District shall not exceed 25 feet except for every 10% reduction in coverage below the permitted 65%, an additional 5 feet of height will be permitted up to a maximum of 40 feet.

(b) In no case shall new construction at the foundation line be located less than 25 feet from the Mystic River at mean water level elevation. (New construction may project into this setback a minimum of 10 feet, provided that it is a minimum of 10 feet above the grade level.*)

(c) In no case shall new construction be located within 10 feet (presently 6 feet) of any property line unless a party line agreement has been properly executed and recorded.

(d) In no case shall building coverage exceed 65% of the lot area.

(e) Multi-family residential units shall be limited to efficiency and one or two bedrooms and density of new multi-family housing shall be determined by Section 5-2 for RMF District except that there is no minimum lot size.

(f) A Certificate of Appropriateness shall be obtained as required by the Historic District Commission regulations.

(g) Where the Planning Commission deems it feasible, it may approve a site plan for a use which does not have direct access from a Town approved road, provided that adequate and safe pedestrian access is provided.

(h) The Planning Commission may waive any of the requirements for off-street parking where it is demonstrated that existing parking facilities are available and adequate only in accordance with provisions of 7.45* and may waive any of the site design standard requirements of the Waterfront Design District for any use where such waiver would be consistent with the intent of these regulations.

(i) Any lot created in a Waterfront Design district zone after the effective date of this paragraph shall conform to the requirements for an RS-80 zone as listed in Section 5.2.

(j) An applicant for a special permit shall demonstrate how the proposed site plan achieves the objectives of provision of pedestrian access to the riverfront and preserves visual access, where feasible and appropriate.

7.45 Location of Required Parking Facilities

Required parking facilities shall be located on the same lot as the building or other use which they serve except as follows:

*Delete.

7.45-1 Because the WDD District is important to the Town's economy, provides a local service and employment base, and because its physical integrity and historic and architectural character must be protected, and further because it is desirable to utilize existing buildings as fully and as efficiently as possible and because land area for parking within the WDD District is very limited, required parking for uses within the WDD District may be provided on sites other than the site which they serve provided that:

(a) Said spaces are within 500 feet walking distance of the lot or use which they serve and are within the WDD.

(b) Such spaces shall preferably be in the same ownership as the use which they serve. However, evidence of a lease for such spaces in a minimum term of ten years shall be acceptable. Such lease shall be recorded in the land records of the Town prior to the filing of the site plan in the land records. Further, the obligation to maintain the required number of spaces as set forth in Section 7.42 is not diminished by the leasing option permitted under this section.

Planning Commission Review in WDD

Most uses within the WDD are subject to special permit and since this requires referral to Planning Commission, this is an additional check on what happens. also, if WDD is all within Coastal Management Areas then Planning Commission reviews with certain exemptions. Certain revisions in 8.61-3 could clarify and expand Planning Commission review to assure compatibility with planning and design objectives. Suggested changes are as follows:

(a) Eliminate items (1), (2) and (3) from exceptions from site plan review.

To further clarify where Planning Commission site plan review is required in the WDD or in any district, the following amendment is proposed.

8.6 Site Plan Review and Approval

8.61 Authority

Site plan review and approval by the Planning Commission shall be required before any zoning permit shall be issued for any building or use, or enlargement in size or other alteration of any building or change in use of any building including accessory structures which enlargement or alteration or change of use results in a more intensive use of a property than prior to such action. More intensive use shall include additional residential units, additional employees, additional clientele or customers, additional floor space for sales or service or additional required parking. No certificate of compliance shall be given unless all construction and development conform to the plans as approved by the Planning Commission.

VIII. Recommendations

RECOMMENDATIONS

A. NON-REGULATORY MEASURES

1. Encourage the harbormasters, in conjunction with the town to develop an improved mooring system along the Mystic River, in order to ensure safe public access along existing navigation channels.

2. In order to preserve water quality in the coves, sewage pumping stations should be protected to prevent flows of sewage into the coves during possible breakdowns in the system.

3. The town should conduct discussions with the Department of Health Services to develop a timetable to reopen shellfish beds in the town.

4. The town, in cooperation with the Water Pollution Control Authority, should develop a program to test septic systems of existing developments along the shoreline to determine whether any are leaking into the coves. Where feasible, inefficient systems should be required to tie into the sewer system. In addition, regular checks on septic systems to ensure reduced pollution, should become standard procedure along the shoreline.

5. The town should actively pursue a plan to control and regulate dredging and filling of the coves and coastal waters through discussions with the Department of Environmental Protection and the Army Corps of Engineers.

6. Enlarge existing waterfront access points in the town where feasible by acquiring suitable sites for waterfront parks, and/or beaches. The town should be constantly alert to any possible sites that become available.

7. The Chairperson's Committee should become involved in the planning of the development of the U.S.S. Nautilus as a tourist attraction.

8. The Town Planning Department should discuss any plans that the Department of Environmental Protection may have to modify existing land use at Bluff Point State Park and Haley Farm State Park.

9. The town should hold discussions with the transit district in order to provide transportation to coastal recreation and tourist areas during the summer.

10. The waterfront along the Thames River between the railroad and the river could be developed in the future for water-dependent uses. The feasibility of using this land for such a purpose is beyond the scope of this study, however the area should be studied for future consideration.

11. The town should develop a waterfront identification program to maximize use of waterfront areas.

B. REVISIONS TO THE PLAN OF DEVELOPMENT

1. The development of the U.S.S. Nautilus as a tourist area on the Thames waterfront is likely to have a major impact in the area. It is therefore suggested that the area immediately adjacent to the new development be designated tourist commercial in order to reflect the future development in the area.

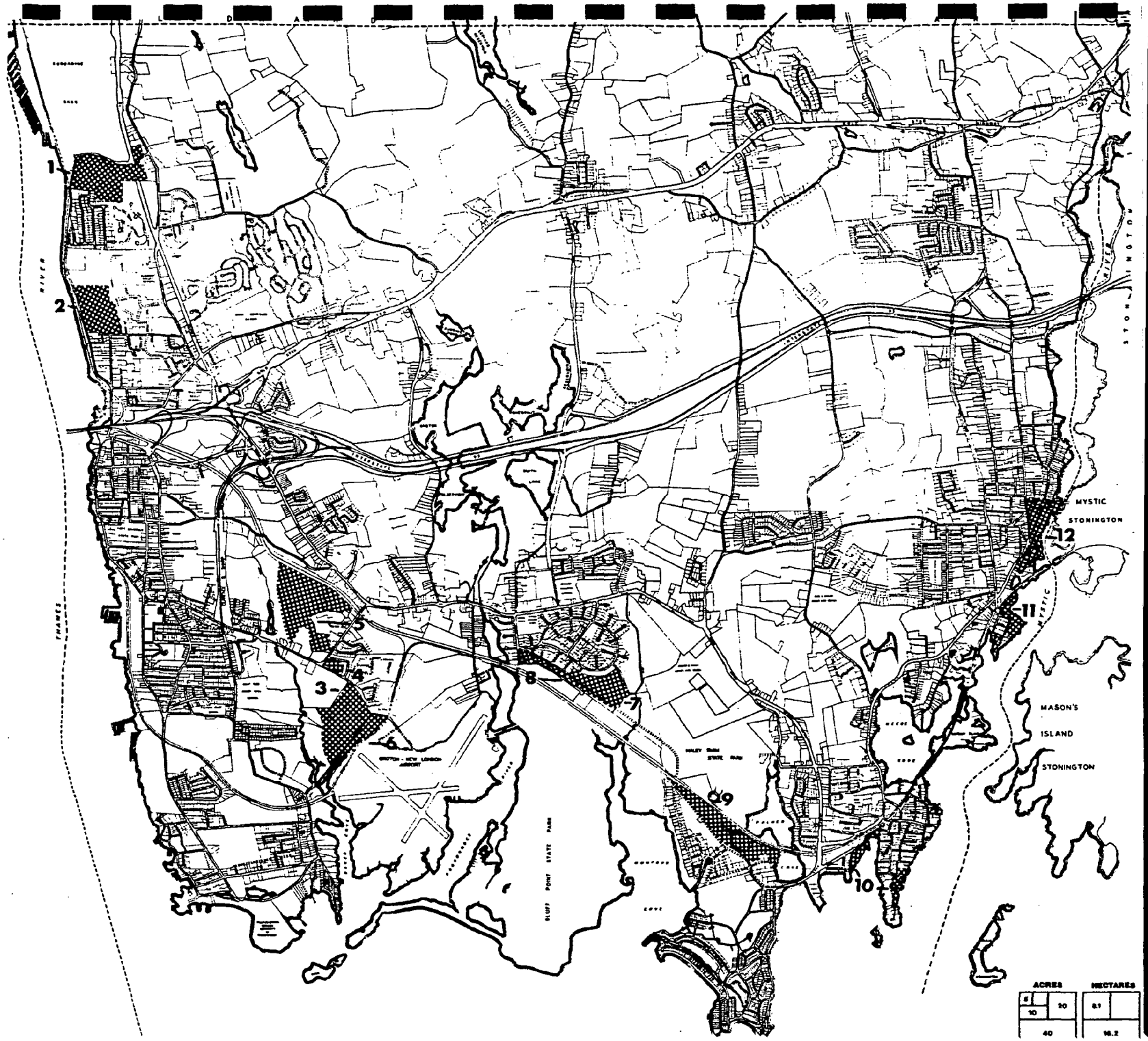
2. The area in which the Odd Fellows Home is located is designated recreation and open space. If this area is developed in the future, it would provide an opportunity to help meet the demand for residential development along the coast without causing any adverse impacts on sensitive coastal resources. Therefore, it is recommended that the area be designated moderate density development.

3. The area west of the airport is designated natural resources, but the only sensitive part of the area is the land adjacent to Birch Plain Creek, designated recreation and open space. The non-sensitive area should be designated industrial, along with other land adjacent to Thomas Road, excluding the tidal wetland area.

4. The area at the southern corner of High Rock Road and Poquonnock Road, presently designated moderate density residential in the Plan of Development, and zoned commercial, should be considered for professional office designation. This modification would be consistent with the concept of centralizing commercial uses in the downtown area.

5. The large tract north of Trail's Corner which is designated natural resources appears to be mislabeled since a natural resource designation does not denote future land use designation. It is recommended that the area be changed to moderate density residential on the Plan of Development.

6. The area designated as moderate density residential, located south of the intersection of Tower Avenue and High Rock Road, should be redesignated to reflect current use and its proximity to the airport industrial complex. Therefore, it is recommended that this area be redesignated to industrial.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STONINGTON
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THAMES
RIVER
STONINGTON
HARBOR
BLUFF POINT STATE PARK
ACRES
HECTARES
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8.1
16.2

7. The area north of Lilly Lane and southeast of Fort Hill Homes is moderate density residential and should be reconsidered for townhouse residential. This would allow an alternative form of housing at a density which is consistent with the Fort Hill area.

8. The area east of Depot Road and north of Industrial Drive is inappropriately designated open space because it has not been slated for acquisition by the town. Therefore, it should be designated as moderate density to conform with the Fort Hill area.

9. The area north of Mumford Cove Estates and south of the railroad line should be redesignated from natural resource to recreation and open space so that it is preserved as per the original subdivision plan.

10. Two large waterfront commercial areas, one on West Cove and the other on the Mystic River side of the peninsula, are designated on the current Plan of Development as general commercial. A new designation, marine commercial/recreation appears to be more suitable, since it pertains to waterfront uses. The marine commercial/recreational designation is defined as: Those uses and facilities which require access to marine or tidal waters and which cannot be reasonably located inland, including, but not limited to: marinas, recreational and commercial fishing and boating facilities, commercial finfish or shellfish processing plants, waterfront docks, boatbuilding facilities, other commercial-recreational uses dependent upon waterborne transportation, and uses which provide general public access to coastal waters.

11. The area currently designated as waterfront design district on Willow Point should be reclassified as a new category, marine commercial/recreation.

12. In Mystic, expand the area currently designated waterfront design district to include the commercial frontage north of Main Street, the existing marina south of Fort Rachel Place/Water Street, and the railroad embankment. In the first two instances, this will make the Plan of Development consistent with present zoning and existing land use patterns.

13. The following be added to open space land objectives in the Plan of Development. Preserve tidal wetland areas as open space. This designation qualifies the owner for special tax considerations under PA-490 if land is maintained as open space.

Plan of development changes will be considered in the future for Noank and the airport industrial area.

C. REVISIONS TO THE ZONING REGULATIONS

1. In order to control new development around the U.S.S. Nautilus which is expected to become a major tourist attraction in the coastal area, a new zone (tourist commercial) should be established which will regulate the type of development in the area.

   The following is proposed language for creating a Nautilus Memorial Design District that will encompass the property currently zoned CB-15 along Route 12 and RMF along Crystal Lake Road and also including portions of undeveloped property in the RS-12 zone.

   Since it is important that the development of new zoning controls for the main entrance to the Nautilus Memorial be coordinated with the planning and design of that facility, this zoning proposal should be considered separately from the remainder of the CAM zoning recommendations. The designers and operators of the Nautilus Memorial should be given an opportunity to comment upon the district proposal. It will also be necessary to develop design parameters for development within the District based upon discussions with this group. Since this process is likely to take longer than that remaining in the Phase II CAM Program, the Planning Commission has determined it should be considered separately and follow its own timeline for consideration.

6.8 Nautilus Memorial Design District

6.81 Purpose

The purpose of this district is to permit and control development within the designated Design District which will protect and enhance the primary entryway to the Nautilus Memorial.

6.82 Design Objectives

All development within the Design District shall be consistent with the following objectives:

a. To ensure the creation of a high quality tourist-service area linked thematically to the Nautilus Memorial.

b. In recognition of the attraction the area will hold for tourists, major focus shall be given to those commercial activities to serve the needs of the visitors to the Nautilus Memorial.

c. To insure that high intensity and bulk uses do not encroach into the surrounding residential districts.

d. Architectural and site design which promotes aesthetic qualities and which will focus and improve the existing commercial environment towards the uniqueness of the Nautilus Memorial.

e. Coordination of a theme design to prevail throughout the Design District.

f. Encourage the assemblage of smaller parcels into larger units for commercial development.

g. Establish a design review committee to provide design guidelines and assist in review of development plans to assure conformity to overall design theme of the Nautilus Memorial.

6.83 Permitted Uses

Any retail or service use, hotel or motel, restaurant, commercial recreation, or mix of same, which is consistent with the purpose and objectives of this Design District is permitted subject to approval of a Special Permit.

In granting or denying approval for a specific proposed use or mix of uses, the Zoning Commission shall evaluate the proposal's conformance with the purpose and objectives as stated in sections 6.81 and 6.82, and determine that the proposal will not be detrimental to the use or value of adjacent properties.

6.84 Building and Development Standards

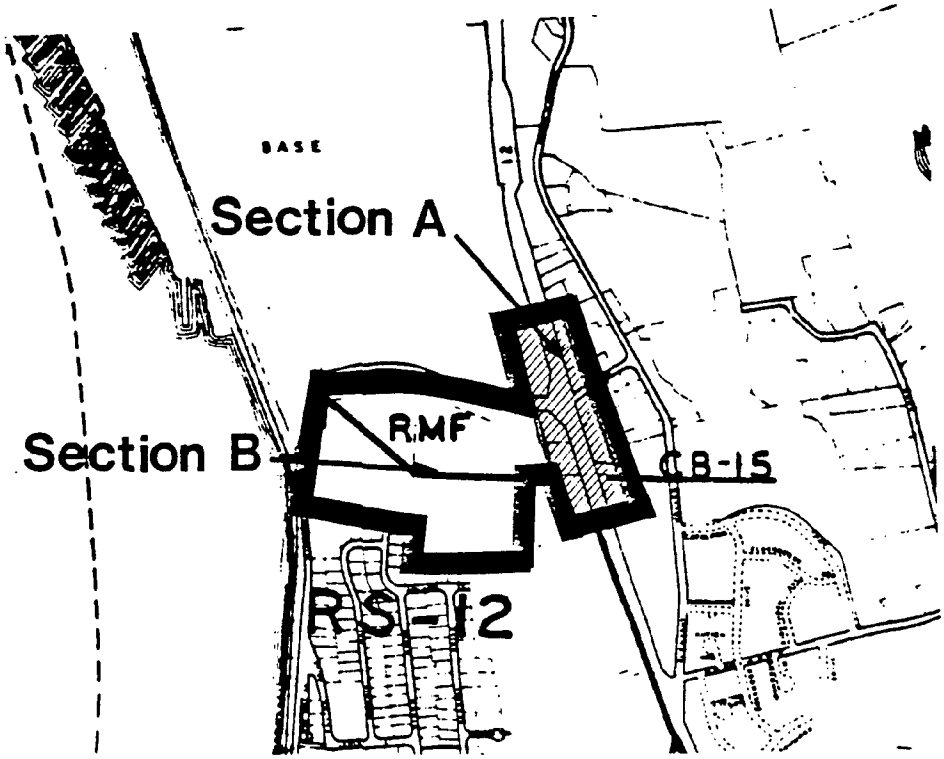
a. Lot, yard and building requirements within Section A of this Design District shall be:

Lot Area: 40,000 sq. ft.
Lot Width: 150 ft.
Min. Front Yard: 50 ft.
Min. Side Yard: 15 ft.
Min. Rear Yard: 15 ft.
Max. Building Coverage: 40%
Max. Building Height: 30 ft.

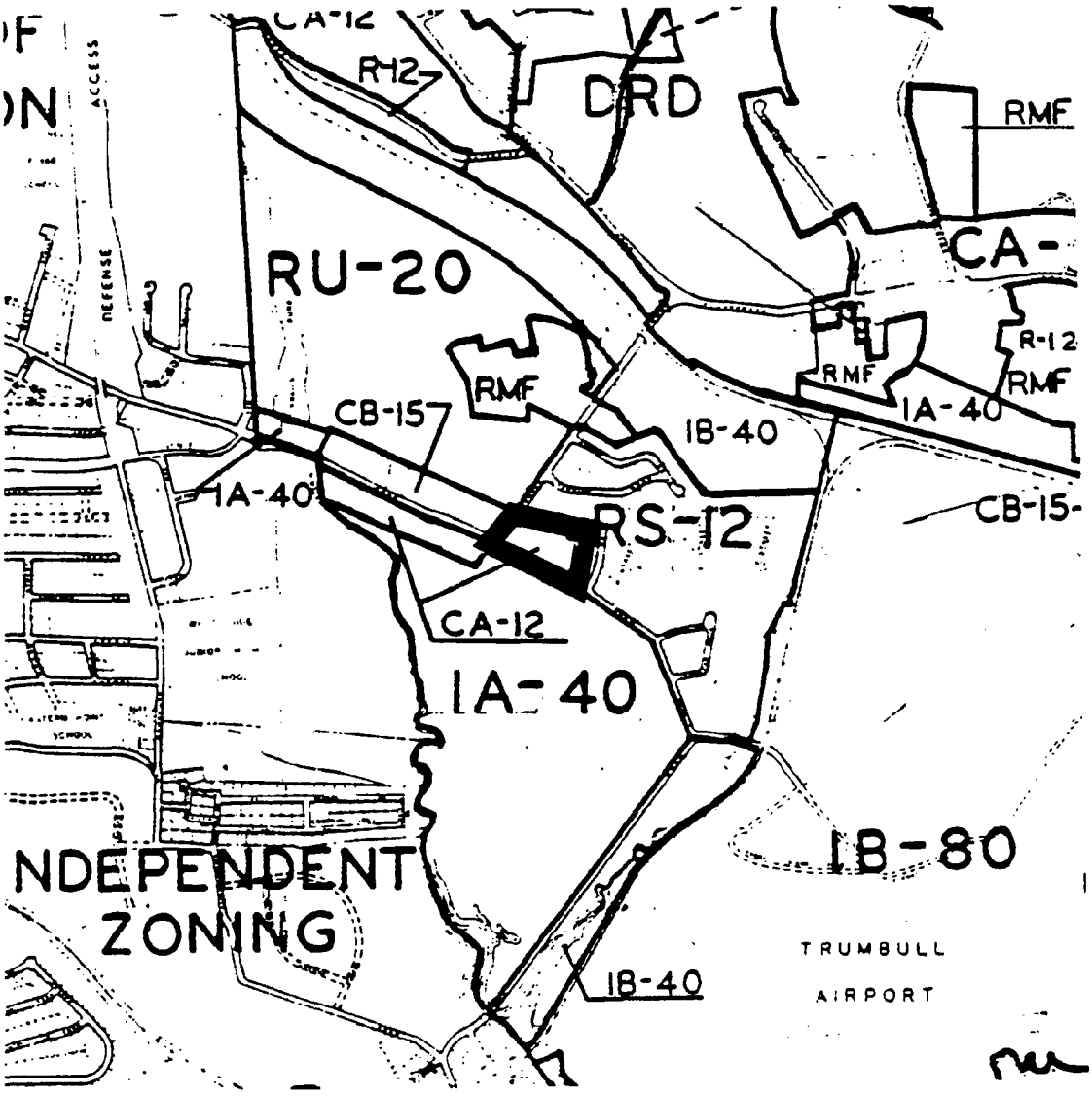
b. Lot, yard and building requirements within Section B of this Design District shall be:

Lot Area: 160,000 sq. ft.
Lot Width: 300 ft.
Min. Front Yard: 50 ft.
Min. Side Yard: 30 ft.
Min. Rear Yard: 30 ft.
Min. Building Size: 25% of the lot area or 40,000 sq. ft. whichever is larger. Commission will consider smaller scale of development if no proposal per this section is received by January 31, 1986.
Max. Building Coverage: 40%
Max. Building Height: 30 ft.

c. No land in Section B, the Nautilus Memorial Design District, shall be subdivided so that any lot shall be less in area than 160,000 square feet and the average lesser dimension of any such lot shall be not less than 300 feet. The Planning Commission may approve the development of any lot with less area or dimensions which existed in separate ownership at the effective date of this Section, and continuously thereafter, provided the Planning Commission finds that the proposed development and its site plan are compatible with the purposes of the Nautilus Memorial Design District and conform to the requirements of Section A of this District.

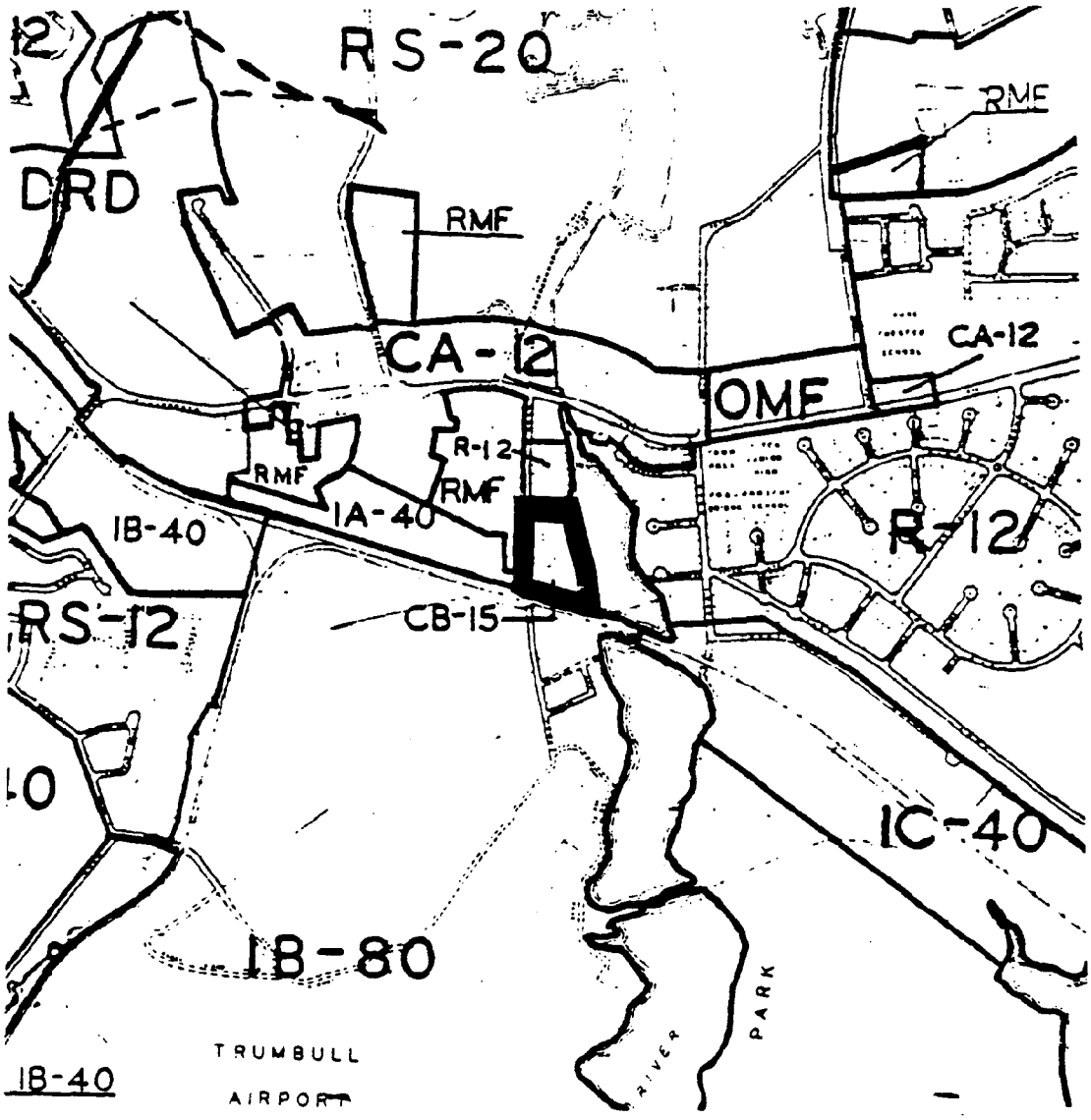


2. The area at the northern corner of High Rock Road and Poquonnock Road presently zoned CA-12 should be zoned OMF (Office Multi Family) which allows one and two-family housing, multi-family uses as well as professional offices. This revision has been referred to the Zoning Commission for formal consideration and public hearing.



3. A small area to the west of the Poquonnock River is zoned commercial, CB-15. Its present land use is single family development and a truck depot. The zoning should be changed to moderate density residential to reflect present development.

During the Phase II work, it was learned that a public hearing concerning a similar zone change proposed in this area was conducted and the owners of the property objected to a proposed change to the present zoning designation. In light of this event it is felt that the proposed coastal resource setback requirements in Revision 8 herein are probably adequate to protect the abutting coastal resource.

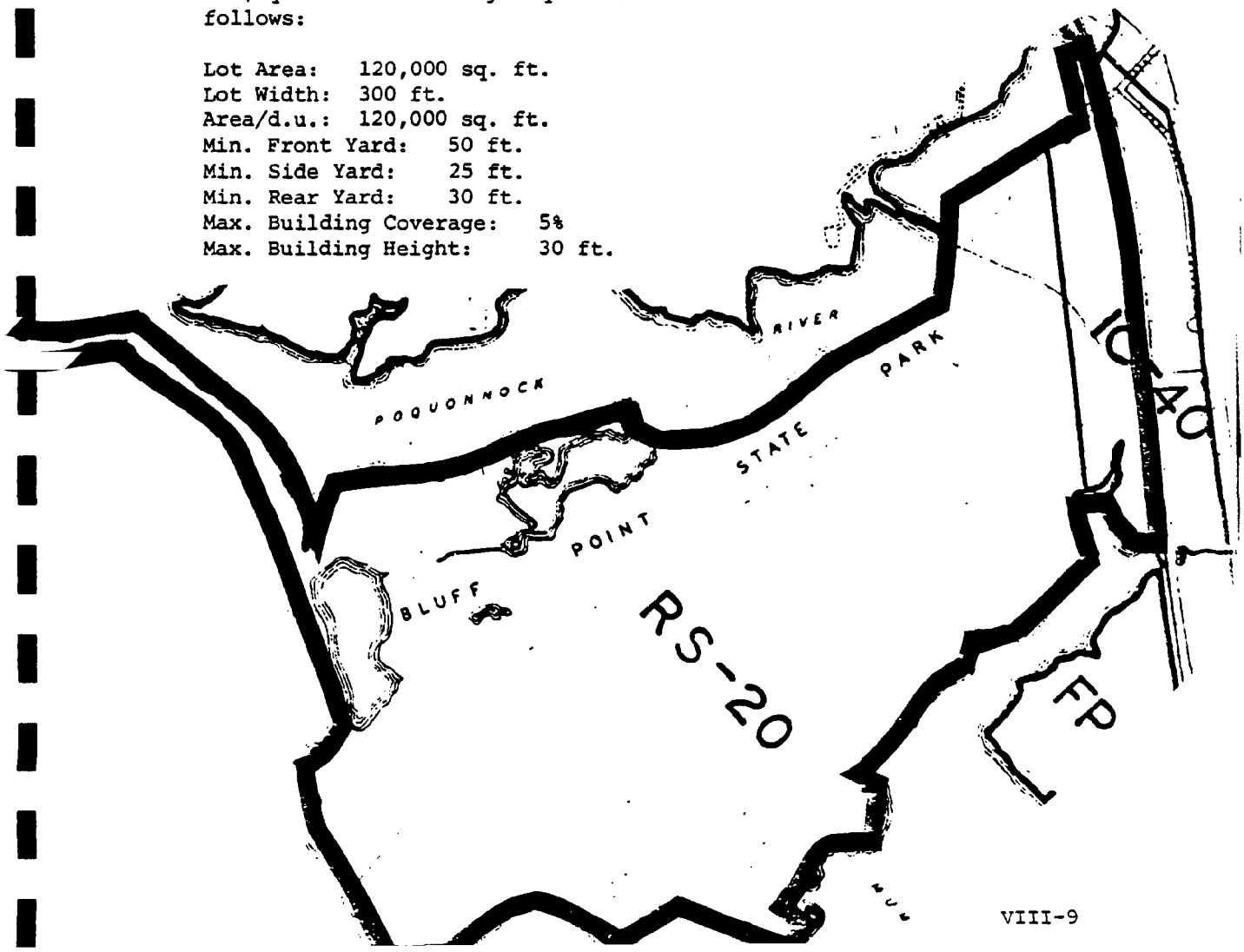


4. The northern section of Bluff Point State Park is zoned industrial, IC-40. The area is not suitable for industrial development and is part of the state park and should therefore be changed to low density residential with a suggested density of 120,000 square feet per lot.

It is important for the local Plan of Development and Zoning Regulations to reflect the Town's intended use of property. As Bluff Point is a critical recreation and open space resource within the Town, its zoning should reflect that circumstance. The recommendation should be broadened to include the southern part of Bluff Point State Park which is currently zoned RS-20 to be included in a new RS-120 zone. Another option under consideration by the Planning Commission is to designate the area an open space zone. When a determination of which approach is most beneficial to the Town is made, it will be forwarded to the Zoning Commission for consideration.

Lot, yard and building requirements for an RS-120 zone should be as follows:

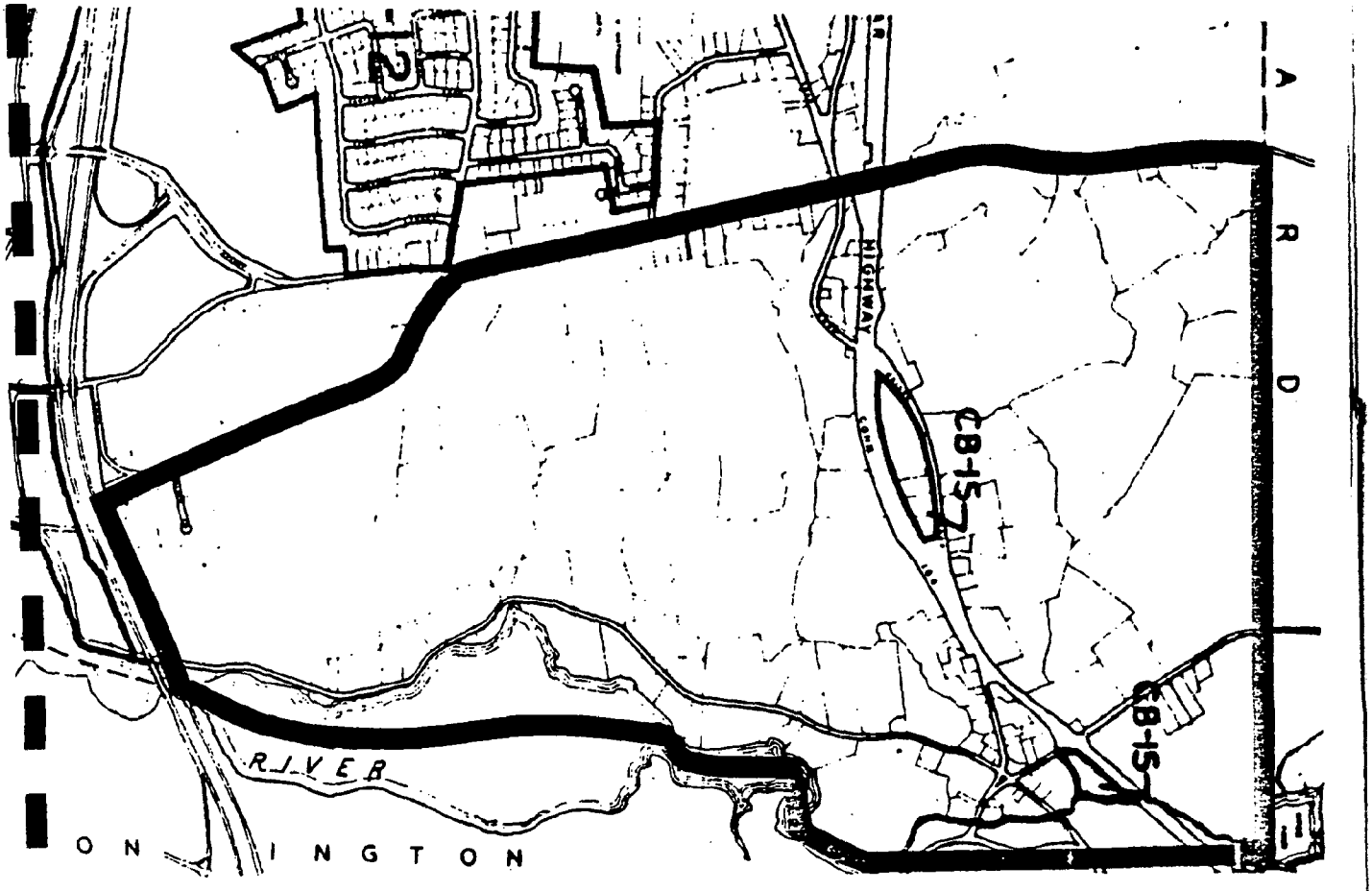
Lot Area: 120,000 sq. ft.
Lot Width: 300 ft.
Area/d.u.: 120,000 sq. ft.
Min. Front Yard: 50 ft.
Min. Side Yard: 25 ft.
Min. Rear Yard: 30 ft.
Max. Building Coverage: 5%
Max. Building Height: 30 ft.



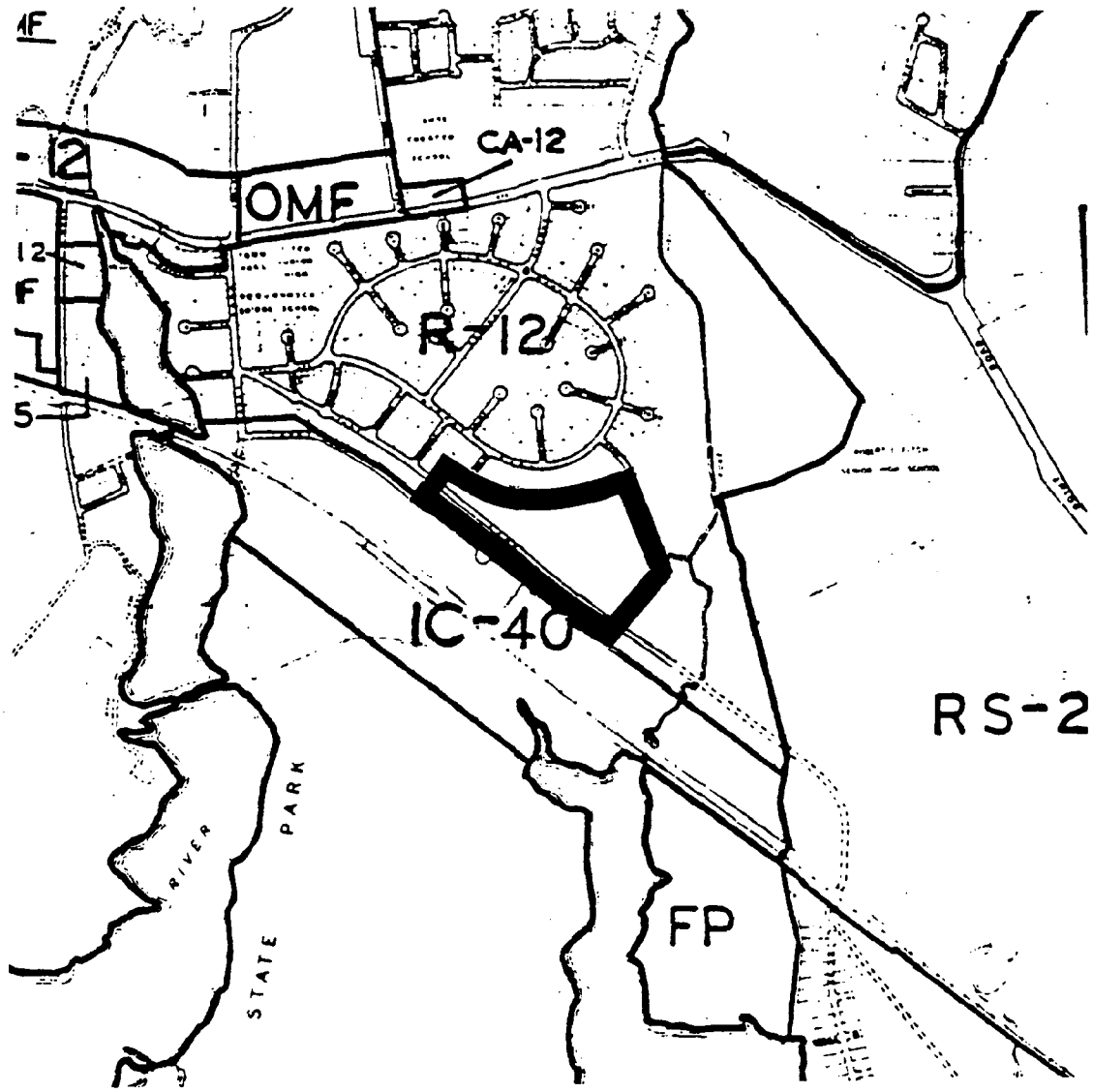
5. The area along the west side of the Mystic River north of I-95 is zoned residential, RU-20, which allows development on half acre lots. As the area is not served by the sewer system and there are no plans to extend it to the area, the area should be rezoned to permit only large lot development, for example 80,000 square feet in accordance with environmental limitations and on-site septic systems. This recommendation has been forwarded to the Zoning Commission for consideration and public hearing.

The lot, yard and building requirements for a RU-80 zone should be as follows:

Lot Area: 80,000 sq. ft.
Lot Width: 200 ft.
Area/d.u.: 60,000 sq. ft.
Min. Front Yard: 50 ft.
Min. Side Yard: 25 ft.
Min. Rear Yard: 30 ft.
Max. Building Coverage: 10%
Max. Building Height: 30 ft.



6. The area north of Lily Lane and southeast of Fort Hill Homes is moderate density residential and should be reconsidered for townhouse residential. This would allow an alternative form of housing at a density which is consistent with the Fort Hill area. This proposal has been forwarded to the Fort Hill Community Development Committee for reaction before being acted upon by the Planning Commission.



7. New development in the coastal zone should pay careful attention to sensitive coastal resources. Therefore, additional safeguards should be added to the zoning regulations requiring greater setbacks from the water's edge and wetlands than presently exist in exchange for greater flexibility in siting structures on a particular parcel.

A proposed Coastal Resource Setback amendment to the Zoning Ordinance follows. It is felt that in those instances where the setback requirement renders a property unbuildable because of the additional requirement that this constitutes a hardship under the regulations and therefore the Zoning Board of Appeals can legitimately remedy such situations. However, in reviewing the zoning map, it appears that these situations should occur infrequently and that this method tampers least with the requirements of each zone classification while providing a means of protecting the natural resource. This revision has been forwarded to the Zoning Commission for consideration and public hearing.

In the Phase I period of the MCP, it was indicated that areas adjacent to Birch Plain Creek and Town Open Space (the Johl property) are zoned industrial, IA-40. In order to protect the sensitive resources, it was proposed the area should be rezoned to low density residential.

In reviewing this recommendation during the Phase II period and in light of the proposed requirements of a coastal resource setback requirement and with Town ownership of the Johl property, it is now felt that adequate protection of Birch Plain Creek can be achieved through the additional setback requirements proposed herein and with existing regulations and coastal site plan review. Therefore, the Planning Commission has determined that the existing zoning designations can be retained and the objective of protecting the sensitive resources can be achieved through the adoption of the coastal resource setback.

Proposed addition of Section 8.61-4 - Coastal Resource Setback

In addition to the requirements of Section 5.2 - Lot, Yard and Building Requirements by Zoning District, the following shall apply to all the lots within the designated Coastal Area Boundary as shown on the map entitled "Coastal Area Management Boundary" on file in the office of the Groton Planning Department: No new building construction, including minor additions to or modifications of existing buildings or detached accessory buildings, such as garages, utility sheds, pools, tennis courts or parking lots shall be permitted within 50 feet of any tidal waterbody or watercourse or of the following coastal resource areas: tidal wetlands, coastal bluffs, escarpments, beaches or dunes, as defined by Chapter 444, Section 22a-93(7) of the Connecticut General Statutes or shown on the map entitled "Coastal Area Management Resource Map" on file in the office of the Groton Planning Department. This Section shall not apply to Section 6.34(b) Waterfront Design District or to water dependent uses as defined by Chapter 444, Section 22a-93(16) of the Connecticut General Statutes.

(7) "Coastal resources" means the coastal waters of the state, their natural resources, related marine and wildlife habitat and adjacent shorelands, both developed and undeveloped, that together form an integrated terrestrial and estuarine ecosystem; coastal resources include the following: (A) "Coastal bluffs and escarpments" means naturally eroding shorelands marked by dynamic escarpments or sea cliffs which have slope angles that constitute an intricate adjustment between erosion, substrate, drainage and degree of plant cover; (B) "rocky shorefronts" means shorefront composed of bedrock, boulders and cobbles that are highly erosion-resistant and are an insignificant source of sediments for other coastal landforms; (C) "beaches and dunes" means beach systems including barrier beach spits and tombolos, barrier beaches, pocket beaches, land contact beaches and related dunes and sandflats; (D) "intertidal flats" means very gently sloping or flat areas located between high and low tides composed of muddy, silty and fine sandy sediments and generally devoid of vegetation; (E) "tidal wetlands" means "wetland" as defined by section 22a-29; (F) "freshwater wetlands and water courses" means "wetlands" and "water courses" as defined by section 22a-38; (G) "estuarine embayments" means a protected coastal body of water with an open connection to the sea in which saline sea water is measurably diluted by fresh water including tidal rivers, bays, lagoons and coves; (H) "coastal hazard areas" means those land areas inundated during coastal storm events or subject to erosion induced by such events, including flood hazard areas as defined and determined by the National Flood Insurance Act, as amended (U.S.C. 42 Section 4101, P.L. 93-234) and all erosion hazard areas as determined by the commissioner; (I) "developed shorefront" means those harbor areas which have been highly engineered and developed resulting in the functional impairment or substantial alteration of their natural physiographic features or systems; (J) "island" means land surrounded on all sides by water; (K) "nearshore waters" means the area comprised of those waters and their substrates lying between mean high water and a depth approximated by the ten meter contour; (L) "offshore waters" means the area comprised of those waters and their substrates lying seaward of a depth approximated by the ten meter contour; (M) "shorelands" means those land areas within the coastal boundary exclusive of coastal hazard areas, which are not subject to dynamic coastal processes and which are comprised of typical upland features such as bedrock hills, till hills and drumlins; (N) "shellfish concentration areas" means actual, potential or historic areas in coastal waters, in which one or more species of shellfish aggregate.

(16) "Water-dependent uses" means those uses and facilities which require direct access to, or location in, marine or tidal waters and which therefore cannot be located inland, including but not limited to: Marinas, recreational and commercial fishing and boating facil-

ities, finfish and shellfish processing plants, waterfront dock and port facilities, shipyards and boat building facilities, water-based recreational uses, navigation aides, basins and channels, industrial uses dependent upon waterborne transportation or requiring large volumes of cooling or process water which cannot reasonably be located or operated at an inland site and uses which provide general public access to marine or tidal waters.

8. Preservation of physical and visual access to the water can be marred by insensitive development. New development adjacent to the water should be required to maintain a percentage of open space through amendments to the Zoning Regulations.

   Upon further study in Phase II, it is now felt that this objective can be achieved through use of the existing Coastal Site Plan Review procedures and therefore no new revisions are proposed.

   In the instance of the Mystic River Waterfront Design District, Design Objective (i) should be broadened to encourage pedestrian access to the river's edge from the Main Street bridge south to the railroad bridge. This objective will provide a specific basis for pursuit of the boardwalk concept.

   A new Section 6.34(j) should be added as follows: The applicant shall demonstrate how the proposed site plan achieves the objectives of provision of pedestrian access to the riverfront and preserves visual access, where feasible and appropriate. This language is contained in Chapter VII.

9. In commercial and industrial uses, control of discharge of hazardous materials and industrial wastes should be regulated under the Zoning Ordinance.

   The Commission felt this to be an important addition to the regulations in light of the recent Johnson Hardware experience and its resultant pollution of the Poquonnock River. It has been referred to the Zoning Commission for consideration and is proposed to apply town-wide.

   Proposed addition of Section 8.61-5 - <u>Hazardous Materials and Wastes</u>

   In addition to the requirements of these Zoning Regulations for commercial and industrial districts, the following shall apply to all parcels within the commercial and industrial districts within the Town of Groton.

   In addition to the information required as part of an application for Site Plan Approval in Section 8.62 through 8.64 of these Regulations,

the applicant shall identify any hazardous materials or wastes to be associated with the proposed occupancy and use of the property. Hazardous materials are defined as any material included in EPA's list of priority pollutants, or Section 3001 of the Resource Conservation and Recovery Act (or Connecticut's Hazardous Waste Regulations, whichever is in effect). If these materials or wastes are to be present than the applicant shall present evidence that all applicable permits and approvals from Federal, State or local authorities have been or are in the process of being obtained. The applicant shall demonstrate that the hazardous materials or wastes shall be contained or managed in such a manner that these substances will not pollute or degrade the natural resources, environment or ecology of the Town of Groton.

At least, the following information shall be presented in satisfaction of this section:

a. The amount and composition of any hazardous materials that will be handled, stored, generated, treated or disposed of on the property.

b. Provisions for treatment, storage and/or disposal of any hazardous materials.

c. Distance to nearest natural resource.

d. Whether public sewer is available or proposed at the location.

e. Septic tank location, size and capacity, and/or sewage lift stations, force mains and grease traps.

f. Expected types and amount of discharge to sewers, to the ground and to surface water.

g. Provisions for stormwater runoff controls which will minimize suspended solids.

h. Location of loading and unloading docks.

i. Provision for containment of any spills.

j. Location and description of outside storage areas and types of materials to be stored.

10. Requirements of Coastal Site Plan Review should be incorporated into the Zoning Regulations.

The attached language contained is extracted from Section 11 of the CAM Act and defines the requirements and applicability of Coastal Site Plan Review. It is meant to replace the existing Section 8.61-3.

These revisions will be held until the new State model exemption regulation is received. The exemption section will be rewritten to clarify that structures within the proposed 50' setback and the Waterfront Design District remain subject to site plan review.

8.61-3 Coastal Site Plan Review

1. Applicability

The following site plans, plans and applications for activities or projects to be located fully or partially within the coastal boundary as shown on the map entitled "Coastal Area Management Boundary" on file in the office of the Groton Planning Department and landward of the mean high water mark shall be defined as "coastal site plans" and shall be subject to the requirements of Chapter 444, Sections 22a-90 through 22a-114 of the Connecticut General Statutes.

a. Site plans submitted to the planning commission.

b. Subdivisions submitted to the planning commission.

c. Plans submitted to a planning commission for a planned unit development.

d. Applications for a special permit submitted to the zoning commission.

e. An application for a zoning variance to the zoning board of appeals.

f. A referral of a proposed municipal project to the planning commission.

2. Exemptions (Note: State model language exemptions to be reviewed and incorporated by Town in this section.

Under the authority of Chapter 444 Section 22a-109(b) of the Connecticut General Statutes, the following uses, structures and activities are exempt from review except that in the instance of properties regulated by Section 6.3WDD, subsections a, b and c below shall not be exempt from coastal site plan review:

a. Minor additions to or modifications of existing buildings or detached accessory buildings, such as garages and utility sheds except in instances where Section 8.61-4 is applicable;

b. Construction of new or modification of existing structures incidental to the enjoyment and maintenance of residential property including but not limited to walks, terraces, driveways, swimming pools, tennis courts, docks, and detached accessory building except in instances where Section 8.61-4 is applicable;

c. Construction of new or modification of existing on premise fences, walls, pedestrian walks and terraces, underground utility connections, essential electric, gas, telephone, water and sewer service lines, signs and such other minor structures as will not substantially alter the natural character of coastal resources or restrict access along a public beach;

d. Construction of an individual conforming single family residential structure except in or within 100 feet of the following coastal resource areas as defined by Section 22a-93(7) of the Connecticut General Statutes; tidal wetlands, coastal bluffs and escarpments and beaches and dunes.

e. Activities conducted for the specific purpose of conserving or preserving soil, vegetation, water, fish, shellfish, wildlife, and other coastal land and water resources; and

f. Gardening, grazing and the harvesting of crops.

3. Coastal Site Plan Contents

A coastal site plan shall include a plan showing the location and special relationship of coastal resources on and contiguous to the site; a description of the entire project with appropriate plans, indicating project location, design, timing and methods of construction; an assessment of the capability of the resources to accommodate the proposed use; an assessment of the suitability of the project for the proposed site; an evaluation of the potential beneficial and adverse impacts of the project and a description of proposed methods to mitigate adverse effects on coastal resources.

4. Coastal Site Plan Action

The board or commission reviewing the coastal site plan shall, in addition to the discretion granted in any other sections of the Connecticut General Statutes or in any special act, approve, modify, condition or deny the activity proposed in a coastal site plan on the basis of the criteria listed in Chapter 444 Section 22a-106 of the Connecticut General Statutes. Further, pursuant to Connecticut General Statutes section 22a-106(e) the reviewing commission must find that the proposed activity is consistent with all applicable goals and policies of section 22a-92 and incorporates as conditions or modifications all reasonable measures which would mitigate the adverse impacts of the proposed activity on both coastal resources and future water-dependent development activities.

11. Revisions to the Waterfront Design District in Mystic are contained in Chapter VII. These proposals have been forwarded to the Zoning Commission for consideration and public hearing.

IX. Next Steps

NEXT STEPS

This document has developed and described specific policies, recommendations, and land use regulations to help guide future development and preservation of the Town of Groton's coastal area. The Town's land use commissions, departments, and legislative bodies must now move ahead with implementation of the program by executing the necessary measures outlined. While previous sections of this report provide a framework for good management of the coast, there are some specific items which require further detailed study. The following items are identified for future study:

1. The need for an adequate Town beach site with suitable access, parking, water quality and shoreline conditions has been evident for years and identifying such a site is of major concern to the Town. Specifically the issue of suitable access to the Old Town Beach on the Poquonnock River, improvements to the New Town Beach at Bluff Point and the search for new areas should be studied intensively.

2. The Noank Village peninsula, which has many unique characteristics and issues, should be examined in more detail concerning its future land use.

3. The shorefront area north of I-95 along the Thames River warrants further study as possible development for marine-related uses and possible use as a dredge material containment area.

4. A feasibility and impact study of an area in the Town or City for siting of a Resource Recovery, Waste to Energy Facility to help meet area solid waste disposal needs.

5. A study of the possible use of the abandoned Mystic River Railroad Bridge embankment for recreational waterfront use.

6. A study of the Birch Plain Creek estuary system concerning impacts of the Town and City development on the ecology, hydrology and biological productivity of the system.

7. Development of a Bluff Point Management Study and Program.

8. Study the feasibility of establishing a linear park along the Thames River in an attempt to link the Nautilus Memorial with Thames Street.

9. Study the feasibility of establishing a linear park along the Poquonnock River from Route 1 to Bluff Point.

10. Develop a comprehensive inventory of all public water access points within the Town and their present and future value as public access areas.

Appendices

APPENDIX A

CONNECTICUT WATER QUALITY CLASSIFICATIONS AND STANDARDS

INLAND WATERS
CLASS AA

Existing or proposed drinking water supply impoundments and tributary surface waters. (See Notes 9, 10, and 21)

1. Dissolved oxygen	75% saturation, 16 hours/day; 5 mg/l at any time.
2. Sludge deposits — solid refuse — floating solids, oils and grease — scum	None other than of natural origin. (See note 8).
3. Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls are used. (See Note 6 and 8)
4. Color and turbidity	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls are used. (See Note 6 and 8)
5. Coliform bacteria per 100 ml	Not to exceed a median of 100 nor more than 500 in more than 10% of samples collected. (See Note 11)
6. Taste and odor	None other than of natural origin.
7. pH	As naturally occurs.
8. Allowable temperature increase	None other than of natural origin except when it can be demonstrated that cold water fish spawning and growth will not be impaired. (See Note 17)
9. Chemical constituents	(See Note 4)
(a) Phosphorus	None other than of natural origin.
(b) Sodium	Not to exceed 20 mg/l

COASTAL AND MARINE WATERS
CLASS SA

Suitable for all sea water uses including shellfish harvesting for direct human consumption (approved shellfish areas), bathing, and other water contact sports; may be subject to absolute restrictions on the discharge of pollutants; authorization of new discharges other than cooling or clean water or dredged materials would require revision of the class to Class SB (See General Policy 5) which would be considered concurrently with the issuance of a permit at public hearing.

1. Dissolved oxygen	Not less than 6.0 mg/l at any time.
2. Sludge deposits — solid refuse — floating solids, oils and grease — scum	None other than of natural origin (See Note 8)
3. Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls are used. (See Notes 6 and 8)
4. Color and turbidity	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls are used. (See Notes 6 and 8) A secchi disc shall be visible at a minimum depth of 1 meter. SAb — criteria may be exceeded. (See Note 14)
5. Coliform bacteria per 100 ml	Not to exceed a median MPN of 70 and not more than 10% of the samples shall ordinarily exceed an MPN of 230 for a 5-tube decimal dilution or 330 for a 3-tube decimal dilution. (See Notes 3 and 12)
6. Taste and odor	None allowable
7. pH	6.8 — 8.5
8. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in on case exceed 83 degrees F or in any case raise the normal temperature of the receiving water more than 4 degrees F. During the period including July, August, September, the normal temperature of the receiving water shall not be raised more than 1.5 degrees F. unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected. (See Note 19)

9. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the waters for any other uses. (See Note 4)

CLASS SB

Suitable for bathing, other recreational purposes, industrial cooling and shellfish harvesting for human consumption after depuration; excellent fish and wildlife habitat; good aesthetic value.

1. Dissolved oxygen	Not less than 5.0 mg/l at any time
2. Sludge deposits — solid refuse — floating solids, oils and grease — scum	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment. (See Note 8)
3. Sand or silt deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls are used. (See Notes 6 and 8)
4. Color and turbidity	A secchi disc shall be visible at a minimum of 1 meter. SBb — criteria may be exceeded. (See Notes 8 and 14)
5. Coliform bacteria per 100 ml	Not to exceed a median value of 700 and not more than 2300 in more than 10% of the samples. (See Notes 3 and 12)
6. Taste and odor	None in such concentrations that would impair any usages specifically assigned to this class and none that would cause taste and odor in edible fish or shellfish.
7. pH	6.8 — 8.5
8. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83 degrees F or in any case raise the normal temperature of the receiving water more than 4 degrees F. During the period including July, August and September, the normal temperature of the receiving water shall not be raised more than 1.5 degrees F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected. (See Note 19)

9. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, or impair the water for any other usage assigned to this class. (See Note 4)

CLASS SC

Suitable for fish, shellfish and wildlife habitat; suitable for recreational boating and industrial cooling, good aesthetic value. (See Note 13)

1. Dissolved oxygen	Not less than 5 mg/l for more than 6 hours during any 24-hour period and at no time less than 4 mg/l. For cold water fishery, SCc, not less than 5 mg/l at any time. SCc — 6 mg/l. (See Note 15)
2. Sludge deposits — solid refuse — floating solids, oils and grease — scum	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment. (See Note 8)
3. Sand and silt deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls are used. (See Notes 6 and 8)
4. Color and turbidity	None in such concentrations that would impair any usages specifically assigned to this class. (See Note 8)
5. Coliform bacteria per 100 ml	Not to exceed an average in any 30-day period of 5000 nor exceed this value in more than 20% of the samples collected during the period. (See Notes 3 and 12)
6. Taste and odor	None in such concentrations that would impair any usages specifically assigned to this class and none that would cause taste and odor in edible fish or shellfish.
7. pH	6.5 — 8.5
8. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83 degrees F or in any case raise the normal temperature of the receiving water more than 4 degrees F. During the period including July, August and September, the normal temperature of the receiving water shall not be raised more than 1.5 degrees F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected. (See

binations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, or impair the water for any other usage assigned to this class. (See Note 4)

NOTES

These notes include additional criteria, and supplementary information to insure proper interpretation and use of the criteria.

1. These criteria do not apply to conditions brought about by natural causes.

2. Class D and Class SD waters are considered unacceptable.

3. All sewage treatment plant effluent shall receive disinfection before discharge to the surface waters with the exception of discharges to the following streams for which disinfection shall be required only during the period from May 1st to October 1st.

Housatonic River (north of I-95 Bridge)
Naugatuck River
Quinnipiac River (north of I-95 Bridge)
Farmington River
Pequabuck River
Connecticut River (north of I-95 Bridge)
Hockanum River
Willimantic River
Shetucket River
Quinebaug River
Thames River (north of I-95 Bridge)

It is recognized that the coliform bacteria criteria may not be met on the above streams during the period when disinfection of sewage treatment plant effluent is not required.

The degree of treatment and disinfection shall be as required by the Commissioner and shall be consistent with the health standards as established by the State Department of Health.

4. The waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal or aquatic life for the most sensitive and governing water use class. Criteria for chemical constituents contained in the "Quality Criteria for Water" published by the Environmental Agency shall be considered and used as guidance. In areas where fisheries are the governing considerations and approved limits have not been established, bioassays are necessary to establish limits on toxic substances, the recommendations for bioassay procedures contained in "Standard Methods for the Examination of Water and Wastewater" and the application factors contained in "Quality Criteria for Water" shall be considered. For public drinking water supplies, the raw water sources must be of such a quality that U.S. Environmental Protection Agency limits as defined by the Safe Drinking Water Act (Public Law 93-523), or state limits if more stringent, for finished water can be met after conventional treatment.

5. The discharge of radioactive materials in concentrations or combinations which would be harmful to human, animal or aquatic life shall not be allowed. In no case shall the Alpha emitters in a surface water exceed a concentration of 1000 picocuries per liter.

6. Reasonable controls may be defined by the Commissioner on a case by case basis or the Commissioner may require that it be affirmatively demonstrated by any person or municipality engaged in such activities that all reasonable controls will be or are being used.

7. The minimum average daily flow for seven consecutive days that can be expected to occur once in ten years under natural conditions is the minimum flow to which the standards apply except when a stream is regulated to result in low flows below that level in which case the standards apply to the absolute low flow resulting from such regulation.

8. Except within designated dredged material disposal areas, waters shall be substantially free of pollutants that: (a) unduly affect the composition of bottom fauna; (b) unduly affect the physical or chemical nature of the bottom; and (c) interfere with the propagation and habitats of shellfish, finfish, and wildlife. Dredged materials dumped at approved disposal areas shall not pollute the waters of the State and shall not result in: (a) floating residues of any sort; (b) release of any substance, biological or chemical constitutents which may result in long-term or permanent degradation of Water Quality Standards overlying or adjacent to the dumping grounds; (c) unintentional dispersal of sediments outside a mixing zone enclosing the designated dump points; and (d) biological mobilization and subsequent transport of toxic substances to food chains.

9. Waters reserved for drinking water supply may be subject to restricted use by state regulations, local ordinance, or by the property owner.

10. Proposed drinking water supply intakes and impoundments and tributary surface waters identified in the long range plan for management of water resources prepared and adopted pursuant to Section 25-5b of the Connecticut Statutes shall be adopted as Class AA.

11. Section 25-26 (a) of the Connecticut General Statutes imposes an absolute restriction on the discharge of sewage to such waters. The Coliform bacteria criteria for "none of human origin" may be waived if the source is outside the state and similar requirements are not imposed by an adjacent state or if the source is a result of recreation in the water (i.e., swimming) which is not restricted by the state.

12. Coliform bacteria criteria are intended to provide a standard for coliform data evaluation and are related to the probability of contamination by undisinfected sewage. High results may be due to soil bacteria or bacteria from the feces of warm blooded animals which are not of sanitary significance. High results should therefore be investigated by sanitary survey or other appropriate means to confirm the cause. Fecal coliform (i.e., coliform organisms from the feces of warm blooded animals), may be useful as a secondary indicator. Although the reliability of fecal coliform analysis is not yet adequate to use as a standard, it is desirable that correlation data be generated. The Region I Office of the U.S. Environmental Protection Agency has suggested criteria for fecal coliform data evaluation. Such criteria should be considered only as a guideline and can be found in Appendix A.

13. The existence of Class C or SC waters shall not be considered a reason for authorizing a new discharge that would not maintain the receiving waters as Class B or SB waters if the receiving waters were of such quality.

14. The use of subscript b in Class Sb is intended to identify those areas where natural conditions or conditions which cannot be expected to be appreciably altered by the control of discharges may preclude bathing. It may also be used in Classes Bb and SBb to designate areas in the immediate vicinity of treated sewage outfalls where bathing is not advisable.

15. The use of subscript c in Classes Bc, Cc, SBc and SCc is to identify areas suitable for cold water fisheries, especially fish passage.

16. The use of subscript s in Classes Bs and Cs is to identify areas suitable for cold water fisheries, including fish spawning and growth.

17. Physical obstructions such as dams, which prevent cold water fish from reaching an area suitable for spawning and growth, shall not be considered a valid reason for not meeting the criteria.

18. There shall be no point source discharge into any natural lake or pond or tributary surface waters which will raise the phosphorus concentration, of the receiving surface waters, including phosphorus contained in suspended matter to an amount in excess of 0.03 mg/l. For the purpose of this note the impoundments listed in Appendix B shall be considered natural lakes or ponds.

19. Upstream of the mouths of the Housatonic River, Connecticut River, and Thames River, the allowable temperature increase shall be consistent with the corresponding Inland Waters Class.

20. Sample collection, preservation, handling and analysis should conform to "Standard Methods for the Examination of Water and Wastewaters", 14th Edition, American Public Health Association, New York, New York 10010. The following references may be used where they contain applicable laboratory methods.

(a) "ASTM Standards", Part 23, Water; Atmospheric Analysis, 1970; American Society of Testing and Materials, Philadelphia, Pennsylvania 19103.

(b) "Methods of Chemical Analysis of Water and Wastes", Environmental Protection Agency Water Quality Office, Analytical Quality Control Laboratory, 1014 Broadway, Cincinatti, Ohio 45263.

(c) Any later edition of the above references or any other different but equivalent methods approved by the Commissioner.

21. Treated backwash water from public drinking water treatment plants may be authorized for discharge back to Class AA waters from which the raw water was drawn subject to the approval of the Commissioner of Health or to Class A waters downstream of a raw water intake on reservoir provided; the backwash water is treated to a level which may be considered clean water and which in the judgment of the Commissioner equals or exceeds the quality of raw water from which it was drawn.

22. Conditions which exist in the water in part due to man's normal uses of the land shall not be considered unnatural. Thus the meaning of the word natural is not limited to only those conditions which would exist in the water if drained from pristine land.

23. Watercourses which are contained in drainage conduits or pipes and which are not assigned a specific class are considered to be of the class of the stream segment to which they discharge.

APPENDIX B

BIOLOGICAL SURVEYS OF THE MUMFORD COVE AND MYSTIC RIVER TIDAL WETLANDS

(taken from the Town of Groton Environment Report
July 1972)

BIOLOGICAL REPORT

ECOLOGICAL UNIT NO. 63

MUMFORD COVE

Wetlands Survey of the State of Connecticut
Marine Research Laboratory
University of Connecticut
Noank, Connecticut 06340

BOTANY

The following plants included in Connecticut Public Act 695 grow in Ecological Unit 63:

high tide bush	*Iva frutescens*, var. *oraria*
sea lavender	*Limonium carolinianum*
salt-wort	*Salicornia europaea*
black grass	*Juncus gerardi*
spike rush	*Eleocharis rostellata*
bulrush	*Scirpus robustus*
chairmaker's rush	*Scirpus americanus*
spike grass	*Distichlis spicata*
switch grass	*Panicum virgatum*
salt meadow grass	*Spartina patens*
salt marsh cordgrass	*Spartina alterniflora*
tall cordgrass	*Spartina pectinata*
bent grass	*Agrostis palustris*
cattail	*Typha latifolia*, *T.* angustifolia

These additional species also typical of saltmarsh plant communities were noted in this unit:

reed	*Phragmites communis*
sea-side goldenrod	*Solidago sempervirens*
terrel grass	*Elymus virginicus*
sea-myrtle	*Baccharis halimifolia*
sweet glae	*Myrica gale*
marsh mallow	*Hibiscus palustris*
orach	*Atriplex patula*
rose	*Rosa palustris*
poison ivy	*Rhus radicans*
Turk's cap	*Lilium superbum*
blue verbena	*Verbena hastata*
bayberry	*Myrica pennsylvanica*
marsh fern	*Dryopteris thelpteris*
swamp-honeysuckle	*Rhododendron viscosum*
maleberry	*Lyonia ligustrian*
water hemp	*Acnida cannabina*
sedge	*Carex stricta*
red chokeberry	*Pyrus arbutifolia*

ZOOLOGY

These marshes are similar to others along the eastern end of Connecticut's shoreline in their relative freedom from adjacent residential areas. The

following fauna were noted at the time of our visits during the quiet winter months:

Mammals	
white tailed deer	*Odocoileus virginianus*
cottontail rabbit	*Sylvilagus floridanus*
meadow vole	*Microtus pennsylvanicus*
Birds	
belted kingfisher	*Megaceryle alcyon*
mourning dove	*Zenaidura macroura*
fish crow	*Corvus ossifragus*
mallard	*Anas platyrhynchos*
black duck	*Anas rubripes*
black-crowned night heron	*Nycticoras nycticorax*
mute swam	*Cygnus olor*
black-capped chickadee	*Parus atricapillos*
song sparrow	*Melospiza melodia*
Molluscs	
softshelled clam	*Mya arenaria*
eastern oyster	*Crassotrea virginica*
quahog	*Mercenaria mercenaria*
Atlantic ribbed mussel	*Modiolus demissus*
Atlantic bay scallop	*Aequipecten irradians*

SUMMARY

The extensive wetlands in this unit qualify for protection under Connecticut Public Act 695. The low concentration of adjacent residences has resulted in clean and picturesque marshes which should be especially useful to shy faunal species and to flora which are most readily displaced due to disturbed environments. Two rather small but well-sheltered estuaries lie within this unit, and marshland is well distributed around them. The establishment of a park along one estuary could help to protect the area from further development.

Derek G. Helmboldt
Francis H. Wolife
Michael Wm. Lefor
June 10, 1971

BIOLOGICAL REPORT
ECOLOGICAL UNIT NO. 65

MYSTIC RIVER

Wetlands Survey of the State of Connecticut
Biological Sciences Group
University of Connecticut
Storrs, Connecticut

BOTANY

The marshes along the Mystic River support the following species of plants listed in Public Act 695 as salt marsh indicator species:

high tide bush	*Iva frutescens* var. *oraria*
sea lavender	*Limonium carolinianum*
spike grass	*Distichlis spicata*
switch grass	*Panicum virgatum*
salt meadow grass	*Spartina patens*
salt marsh cordgrass	*S. alterniflora*
salt marsh grass	*S. pectinata*
black grass	*Juncus gerardi*
rush	*Scirpus americana*
swamp grass	*Agrostis palustris*

The following indicator species, not listed in the Act, were also present:

seaside goldenrod	*Solidago sempervirens*
terrell grass	*Elymus virginicus*
arrow grass	*Triglochin maritima*
reed	*Phragmites communis*
marsh rose	*Rosa palustris*
groundsel tree	*Baccharis halimifolia*
marsh mallow	*Hibiscus palustris*
orach	*Atriplex patula*
poison ivy	*Rhus radicans*

ZOOLOGY

A rich avifauna was also present:

sparrow hawk	*Falco sparverius*
eastern belted kingfisher	*Megaceryle alcyon*
turkey vulture	*Cathartes aura*
red-breasted merganser	*Mergus serrator*
American coot	*Fulica americana*
great black-backed gull	*Larus marinus*
mourning dove	*Zenaidura macroura*
canvasback	*Athya valisineria*
bufflehead	*Glaucionetta albeola*
mallard	*Anas platyrhynchos*
mute swan	*Cygnus olor*
herring gull	*Larus argentatus*

Invertebrates

Atlantic ribbed mussel	*Modiolus demissus*
blue crab	*Callinectes sapidus*
quahog	*Mercenaria mercenaria*

Mammals

meadow vole — *Microtus pensylvanicus*

Although some filling has taken place in the past, we did not notice any serious disturbances of the marshes in this unit. These wetlands support a fine variety of plant and animal life, and are well worthy of preservation under Public Act No. 695.

Michael Wm. Lefor
Derek Helmboldt
Francis H. Wolfe
March 1971